

News shocks in the data: Olympic Games and their macroeconomic effects

by

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Abstract: We examine the macroeconomic effects of bidding for the Olympic Games using panel data for 188 countries during the period 1950-2009. Our findings confirm that economies react to news shocks: investment, consumption, and output significantly increase nine to seven years before the actual event in bidding countries. Hosting countries also experience significant increases in investment, consumption and output five to two years before the hosting of the Games. The macroeconomic effects associated with hosting the Olympic Games occur well in advance before the actual event.

Key Words: News/Noise Shocks, Mega Event, Anticipation

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According to Herodotus, in the ancient Greek times when the Olympics were on, Xerxes and Mardonius asked to a group of Greek deserters what prize the Olympic winners should get. The answer was “An olive-wreath.” Tigranes, one of Xerxes’s generals, uttered: “Good heavens! Mardonius, what manner of men are these against whom you have brought us to fight – men who contend with one another, not for money, but for honor!” Herodotus (Book 8, Urania, 26, 1)

1. Introduction

Contemporary economists have no clear answer on whether the organization of the modern Olympic Games is a matter of honor or a matter of money. Although the acquirement of international prestige is obvious, the economic advantages for hosting the Games are not that clear. The economic benefits of hosting the Games are dubious for most academics who have conducted independent research on the issue (see, for example, Owen (2005)). In particular, the current consensus in the literature is that the contemporaneous and post-hosting effects of the Olympic Games on output and aggregate demand are limited. From a macroeconomists point of view, this is a puzzle because total expenditures on these mega events are large: for example, the total cost of the Summer Olympic Games that were held in China in 2008 is estimated to be in the range of 40-60 billion USD.¹

The starting point of our analysis is that the bidding for a mega event such as the Olympic Games is associated with important anticipation effects. One of the main results in modern macroeconomic theory, summarized in Lorenzoni (2011), is that the economy should react to this news already before the event takes place: consumers and firms may become more optimistic about future economic prospects; they, thus, spend more and aggregate private consumption and investment increase at the time of optimism. If the optimism is justified, the economy converges to a higher long-run path; if it is not, output returns to its original trend.

Identifying empirically news shocks is a tough task because identification problems can be severe. For example, Beaudry and Portier (2006) use a bivariate VAR that includes a measure of TFP and the quarterly S&P 500 index and identify news shocks as a shock that does not affect productivity in the short run but affects productivity in the long run. The identified news shocks lead to positive

1 See http://en.wikipedia.org/wiki/Cost_of_the_Olympic_Games, or <http://epiac1216.wordpress.com/2008/08/03/the-total-cost-of-the-beijings-summer-olympic-games>. Available data on the estimated expenditures of other recent Olympic Games, such as those hosted in Italy (2006), Greece (2004), and the US (2004) show that total expenditures on the Olympic Games are typically also in the billions. See also http://en.wikipedia.org/wiki/Cost_of_the_Olympic_Games_for_further_information.

conditional comovements among macroeconomic aggregates and, moreover, are found to be an important source of business cycle fluctuations. On the other hand, Barsky and Sims (2012) identify news shocks as shocks that have the most predictive power in explaining future TFP but are orthogonal to the current TFP innovation. They find that output, investment and hours fall slightly after a news shock while consumption increases. Blanchard et al. (2010) show that the use of structural identification assumptions in a VAR setting is sensitive to the informational assumptions made and that SVAR shocks may be perfectly anticipated by the consumers. These authors point to the adoption of more structural models for the identification of news shocks. Schmitt-Grohe and Uribe (forthcoming) present a structural model in which agents receive anticipated news. They find that such shocks account for about half of predicted aggregate fluctuations.

The literature has also looked at the effects of data revisions as a source of noise in private sector forecasts. For example, Frenkel (1981), Engel and Frankel (1984) and Hardouvelis (1987) have looked at the response of interest rates to the news embodied in the weekly money supply announcements. Hardouvelis (1988) and Gürkaynak et al. (2005a and 2005b) examine how exchange rates, interest rates, and long-term forward rates respond to monetary news and to monthly macroeconomic news. Such news coming from the unemployment rate, the industrial production index, personal income, and orders of durable goods series provide information about the state of the business cycle and are closely watched by economic forecasters. Bartolini et al. (2008) explore how the release of new economic data affects asset prices in the stock, bond, and foreign exchange markets.

All these studies employ time series information and do not exploit specific announcements – such as the organization of the Olympic Games – to measure news shocks in the data. Because of the particular nature of the bidding and planning process, the Olympic Games provide a unique opportunity to test for anticipation effects in macroeconomic data: about ten to eight years before the actual hosting of the Olympic Games the bidding process begins; then, after a technical evaluation of the original bids by the International Olympic Committee (IOC), the top five bids are shortlisted -- and a host city is selected seven years before the actual organization of the Olympic Games. The election of the host city is made by the assembled active IOC members, each possessing one vote. Members from countries that have a city taking part in the bidding for the Olympic Games are unable to vote.

Given the nature of the bidding process, agents in candidate countries receive a signal for possible macroeconomic changes ten to eight years before hosting. The bidding signal gives typically a 1/5 probability to the country for holding the event, while the winning signal, seven years before the

organization, produces certain news for investment planning in the following years. This particular information structure allows us to test whether such news affect economic behavior and explicitly examine the role of expectations and uncertainty realization in shaping macroeconomic outcomes. To the best of our knowledge our study is the first in the literature to investigate if agents react in anticipation of future events with macroeconomic data using a widespread signal such as the organization of the Olympics.

To analyze the effects of Olympic “news” we use a panel of 188 countries spanning the period 1950-2009. We construct two separate Olympic Games indicator variables. One for countries that bid and were selected to host the Games; and another for countries that bid and were not selected to host the Games. We employ panel fixed effects estimation techniques that allow for contemporaneous, future, as well as lagged effects of the Olympic Games. Within this panel fixed effects estimation framework, we examine how variations in countries' per capita GDP growth, private consumption, investment, government consumption expenditures, the price level and the exchange rate are related to the hosting and bidding for the Olympic Games.

Our empirical analysis provides support for the identification scheme adopted in Beaudry and Portier (2006): in the bidding countries output growth, investment, and private consumption significantly increase about nine to seven years before the Olympic Games are hosted. According to the theoretical predictions, after the announcement of the hosting country, investment decreases in the bidding countries (that unsuccessfully bid to host the Games) and there are no significant long-run effects associated with bidding for the Olympic Games on output, investment, or private consumption.

In contrast to the bidding countries, there is a significant positive effect on macroeconomic variables in hosting countries that occurs five to two years before the hosting of the Games. GDP growth increases significantly during the previous five years before hosting, and the peak response occurs four years before the actual hosting. This increase in GDP per capita growth is due to a significant positive and quantitatively large increase in investment and private consumption. Government consumption spending also increases significantly four years in advance of the actual event. Our empirical analysis of the effects in hosting countries thus implies that hosting the Olympic Games entails more than an "Olive Wreath": it has real macroeconomic effects that are positive as well as long-lasting; and these effects show up in the data well in advance of the actual hosting of the event. It is also important to note that the responses of key macroeconomic variables are significantly different between bidding and hosting countries after the announcement of which country gets to host

the Olympic Games (for the years preceding the announcement the differences in effects between bidding and hosting countries are all insignificant).

Recently, Rose and Spiegel (2011) show that hosting and bidding for the Olympic Games has a positive impact on international trade. Using a variety of trade models, the authors document that this effect is statistically robust, permanent, and large. Our paper should be viewed as complementary to their study. First, the focus of our paper is on a broad set of macroeconomic variables such as growth in GDP per capita, consumption, and investment. Second, Rose and Spiegel claim that what matters for the increase in international trade is the signal countries send to international markets when bidding for the Olympics. We show that the bidding and hosting of the Olympics entails more than that since these events are associated with significant anticipation effects that induce positive output, investment, and consumption responses well in advance before the actual hosting of the Games. Our finding of significant anticipation effects is of substantive interest, both to the field of international macroeconomics as well as to the policy debate on the costs and benefits of hosting the Olympic Games. Third, by focusing on the anticipation effects associated with the hosting and bidding for the Olympic Games, we can provide an answer to a number of questions left open in Rose and Spiegel such as, for example, why open economies should bid to host the Olympic Games and why countries bid repeatedly for the organization of such events.

The remainder of the paper is organized as follows. Section 2 describes the data and estimation approach. Section 3 presents the main results. Robustness checks are discussed in Section 4 and Section 5 concludes.

2. Data and Estimation Approach

We obtain data on the Olympic Games bidding and hosting countries from www.olympic.org. Data Appendix Table 1 lists the bidding and hosting countries in our sample. Data on real per capita GDP, private consumption, investment, government consumption expenditures, the consumer price level, and the nominal exchange rate (defined as the ratio of home to US currency) are from the Penn World Table, version 7.0 (Heston et al., 2011). The data on exports and imports are from the World Development Indicators (World Bank, 2011).

We estimate the effects of the Olympic Games using a panel of 188 countries spanning the period 1950-2009.² This is the largest possible sample given the availability of data. The econometric

² In our working paper Bruckner and Pappa (2011) we reported estimates for the 1950-2007 period, thus excluding the

model is:

$$Y_{it} = a_0 Host_{it} + A(L)Host_{it} + B(F)Host_{it} + c_0 Bid_{it} + C(L)Bid_{it} + D(F)Bid_{it} + \alpha_i + \beta_t + e_{it} \quad (1)$$

where $Host_{it}$ is an indicator variable that is unity in country i and year t if the country hosted in year t the Olympic Games. Bid_{it} is an indicator variable that is unity in country i and year t if the country was bidding to host the Olympic Games that were held in year t . Because over the 1950-2009 period bidding to host the Olympic Games took place about eight to ten years before the actual hosting of the Games, we include up to ten leads of the bidding and hosting country indicator variable on the right-hand side of the estimating equation, so that $B(F) = b_1F + b_2F^2 + \dots + b_{10}F^{10}$ and $D(F) = d_1F + d_2F^2 + \dots + d_{10}F^{10}$. The coefficients in the polynomial $B(F)$ and $D(F)$ capture the ex-ante effects of hosting and bidding for the Olympic Games. Similarly, we examine the ex-post effects of the Olympic Games by including up to ten lags on the right-hand side of the estimating equation, such that $A(L) = a_1L + a_2L^2 + \dots + a_{10}L^{10}$ and $C(L) = c_1L + c_2L^2 + \dots + c_{10}L^{10}$. The contemporaneous effects of the Olympic Games for the bidding and hosting countries are captured by the coefficients a_0 and c_0 . We examine whether bidding and hosting the Olympics has long-run (i.e. permanent) effects on the outcome variables $Y_{i,t}$ by testing whether the sum of the estimated coefficients on the contemporaneous, ex-ante and ex-post dummy variables is significantly different from zero.

Note that as control variables in equation (1) we have included country fixed effects α_i and year fixed effects β_t . The country fixed effects are an important control variable because they account for time-invariant country specific unobservables that may affect the likelihood of hosting and bidding for the Olympic Games and the outcome variable Y_{it} . Hence, any fixed factors such as climate, continent, language, or differences in average incomes per capita are controlled for with the inclusion of the country fixed effects. The year fixed effects account for year-specific common factors, such as for example the world business cycle. Because we control for both country and year fixed effects our estimated slope coefficients can be interpreted as a result of a difference-in-difference estimation.

Our outcome variables – real per capita GDP, consumption, investment, government consumption expenditures, the price level, and the exchange rate – are highly persistent. In fact, the Im, Pesaran, and Shin (2003) panel unit root test does not reject the null hypothesis of a unit root in these

recent financial crisis. Given the recent availability of an updated PWT 7.0 database that allows coverage up to 2009, we report in this paper estimates for the longest possible sample. Estimates reported in Bruckner and Pappa (2011) that excluded the years 2008 and 2009, and that were based on the PWT 6.3 data, yielded very similar results to the ones reported here.

variables, but it rejects the hypothesis of a unit root for the first difference. Therefore, we use the first difference of these logged variables in the estimating equation. We note that we cluster the error term, e_{it} , at the country level so that it may be arbitrarily serially correlated within countries over time.

Our key identifying assumption in the estimation of equation (1) is that, conditional on fixed country characteristics, the hosting and bidding for the Olympic Games is randomly assigned. Of course, a certain level of economic development is required to host the Games. However, whether countries have this level of economic development is captured by the country dummies, α_i . In other words, these country dummies take into account that some countries have the capacity to host the Games while other countries do not have this capacity. Our assumption of random assignment is, thus, that conditional on having the capacity to host the Olympic Games the timing of when countries bid and host the Games is random. In this regard, it is important to note that the bidding for the Olympic Games takes place ten to eight years prior to the celebration of the Games. The incidence of the Olympic Games is therefore a predetermined event. The fact that bidding countries are excluded from voting when the International Olympic Committee convenes to decide which country will be selected to host the Olympic Games also implies that bidding countries have no influence on which country is chosen to host the Games. We will come back to the assumption of random assignment in Section 4.1 where we discuss and investigate it further.

3. Main Results

3.1. Anticipation Effects

We begin the discussion of the results by focusing on the bidding countries, and thus, on anticipation effects. Beaudry and Portier (2006) show using a SVAR approach that news shocks lead to positive comovements in aggregate variables that mimic demand shocks. From a partial equilibrium point of view it is easy to model an economy in which news increase output, investment and consumption. Agents receive news about future developments that change their expectations about the future, which makes them spend and invest more. Both the permanent income hypothesis and the neoclassical investment theory would support this view. The literature has provided mechanisms (see Lorenzoni (2010) for an extensive review) that deliver increases in consumption, investment, output and hours after a news shock in general equilibrium models. The news shock we consider can have many interpretations: it can be thought of as news about future government investment that enhances private productivity and results in increases in aggregate demand during the bidding phase; it can be thought of

as a shock to expected demand from tourism; or as a structural reform that increases the openness of the economy (see, e.g., Rose and Spiegel (2011)).

Our results in Table 1 are consistent with the finding in Beaudry and Portier (2006): output growth, investment, and private consumption significantly increase during the period that countries bid for the Olympics. There is a significant positive output growth, investment, and private consumption response in the bidding countries about seven to nine years before the actual hosting of the Games. Investment responds first, while output and private consumption react with a one-year lag relative to investment. Government consumption spending, the price level and the exchange rate do not react significantly to the news.

Moreover, responses should be similar for all bidding countries between the bidding dates and the decision date. Panel A of Table 4 reports the p-values on the null hypothesis that the ex-ante and contemporaneous coefficients on the hosting and bidding indicator variables (that we obtained from equation (1)) are the same. The main finding is that the coefficients ten to six years prior to the event are not significantly different in the bidding and hosting countries; this can be seen from the p-values which are all larger than 0.1 for the null hypothesis that the coefficients are equal. Hence during the time of the bidding phase, there is no evidence that the macroeconomic effects differ for unsuccessful bidding countries and hosting countries. Given that there is no evidence of a significant difference in the effects, we report in Table 2 estimates from an alternative regression where for the bidding phase, unsuccessful bidding countries are pooled with hosting countries. The main result is that this alternative regression confirms the presence of anticipation effects: private investment, consumption and output react significantly eight to nine years before the organization of the Games. We now turn to discussing our estimates of the effects of the actual hosting of the Olympic Games.

3.2. Hosting Effects

3.2.1 Contemporaneous and Ex-Ante Effects

We report in Table 3 estimates of the contemporaneous and ex-ante effects of hosting the Olympic Games. Column (1) shows that countries which hosted the Olympic Games experienced a significant increase in their real per capita GDP growth up to five years before the organization of the event. The peak effect occurs about four years prior to hosting. The estimated coefficients imply that at peak real per capita GDP growth increases by up to two and a half percentage points. Notice that in the year when the Olympic Games are hosted the effect on GDP per capita growth is positive but insignificant,

which suggests that the main effects on GDP per capita growth occurred already well in advance before the actual hosting of the Games.

It is noteworthy that the results in column (1) of Table 3 are compatible with the patterns of actual investment since many countries followed the 2-4-1 investment plan before the Games: 2 years of planning, 4 years of constructions and 1 year of testing (see, e.g., Preuss (2004)). Indeed column (2) of Table 3 shows that the reason for the significant increase in GDP per capita growth is a significant positive and quantitatively large increase in investment. The peak investment effect coincides with the peak output effect. Investment responses are still significantly different from zero three years before actual hosting. Investment reacts faster than government consumption spending (see column (4) of Table 3). The strongest reaction of government consumption spending occurs on average two years before hosting. Column (3) shows that the private consumption response follows a similar pattern as output; the exception is that, in contrast to output, the contemporaneous response of private consumption to the hosting of the Olympic Games is positive and significant at the 5 percent significance level.

We find also a significant positive ex-ante effect of the hosting of the Olympic Games on the consumer price index and the nominal exchange rate. The estimates in columns (5) and (6) of Table 3 show that there is already a significant positive response in consumer prices five years before the actual hosting of the Olympic Games; and in the exchange rate about seven years before the actual hosting, that is, at the time when the announcement of the hosting country is made.

In Figure 1 we present our findings differently by plotting the cumulative effects (and 90% confidence bands) after the announcement of the Olympic Games hosting country. The figure is clear about the importance of the ex-ante effects: all variables, except government spending, increase significantly prior to hosting with exchange rates reacting more significantly immediately after the announcement.

Comparing the maximum output responses between the bidders (Table 1) and the winners (Table 3) we note that actual hosting increases GDP growth by three times more than bidding for the Games. Moreover, the impact of hosting on GDP is quite sizable if one considers how big Olympics are relative to the size of the hosting economies. It is difficult to find accurate data on actual spending associated with the Olympics. Preuss (2004) provides some evidence on the size of the Games and suggests they vary between 0.006 (Atlanta 1996) and 5 (Athens 2004) percent of GDP, with an average of 0.4 percent of GDP. Because our panel estimates capture an average response, we need to use the

average spending on the Olympic Games to compute the average dollar increase in GDP for each dollar spent on the Olympic Games (the "multiplier). Using the 0.4 percent of GDP as a benchmark for the average country's spending on the Olympic Games, the coefficients in column (1) of Table 3 imply a peak multiplier (at four years before the hosting of the Olympic Games) of about six.

According to the expectations hypothesis responses should be similar for all bidding countries between the bidding dates and the decision date. However, once the International Olympic Committee has announced which country will host the Games, responses should differ between hosting and unsuccessful bidding countries. The Olympics bidding can also be interpreted as a noise shock in the spirit of Angeletos and La'O (2010). In unsuccessful bidding countries the agents' optimism turns out to be unjustified and, as a result, the economy returns to its original trend. Panel A of Table 4 shows that indeed this is the case. The coefficients that capture the effects of the Olympic Games on GDP growth two to five years before the celebration of the Games in the host countries are significantly different from the coefficients in the bidding countries. Hence, pooling unsuccessful bidding countries with hosting countries as we did in Table 2 is a valid approach for testing anticipation effects (since the p-values in Panel A of Table 4 for ten to six years prior to the hosting of the Games indicate no significant difference between unsuccessful bidding and hosting countries), but it is not a valid approach for testing ex-ante effects that may be present up to five years before the actual hosting of the Games.

3.2.2. Ex-Post Effects

Table 5 examines whether hosting the Olympic Games has significant ex-post effects. Columns (1) and (3) show that the effects on output and private consumption are positive up to six years after the hosting of the Olympic Games. After six years the growth responses turn negative in sign, but they are statistically insignificant. For investment, the lagged effects of the Olympic Games are significantly negative in sign already two years after the actual hosting of the Games. Also, for government consumption expenditures, the consumer price index, and the nominal exchange rate the ex-post effects of hosting the Olympic Games are quantitatively small and insignificant. Table 5 therefore shows that the ex-post effects of hosting the Games are of relatively minor importance when compared to the ex-ante effects.

The results in Table 5 might justify the findings of many studies (see Owen (2005)) that indicate that the economic benefits of organizing mega events such as the Olympic Games are quantitatively

and economically small. Our analysis stresses that the benefits from organizing such events are not contemporaneous, nor lagged. We find that the positive effects of the Olympic Games have to do with the ex-ante effects they induce.

3.2.3 Cumulative Effects

The hosting of the Olympic Games may be associated with a long-term legacy effect. According to the supporters of the Olympic Games infrastructure investments lead to improvements in overall production conditions for domestic and foreign enterprises, making investment more attractive and increasing GDP per capita in the long run. We can examine whether the hosting and bidding for the Olympic Games had a long-run effect on the level of GDP per capita and the other variables of interest. We do this by summing up the estimated coefficients, and test whether their sum is significantly different from zero.

Panel A of Table 6 shows that for the hosting countries the sum of the estimated coefficients for the GDP per capita and private consumption response are positive and significantly different from zero at the 90 percent level. For the hosting countries the Olympic Games were hence associated with permanently higher levels of GDP per capita and private consumption. On the other hand, Panel B shows that for the bidding countries there were no significant long-run effects. The sum of the estimated coefficients is quantitatively small and statistically insignificant at any conventional confidence level. In Panel C we test for the existence of significant differences between the long-run effects of the Olympic Games in the host countries and the bidding countries. For GDP per capita and consumption we can reject with over 95 percent confidence that the long-run effects are the same in the host and the bidding countries.³

In Figure 2 we plot the cumulative effects for the host countries (continuous line) and the bidding countries (dashed line) for the set of variables we consider. The cumulative responses of all the variables for the periods before the announcement of the hosting country are similar and we cannot reject the hypothesis that both hosting and bidding countries behave the same. However, after the

3 In Appendix Table 1 we document that the estimates on the lagged Olympic Games bidding indicators are either significantly negative or insignificant. In Appendix Table 2 we document that the findings on the long-run estimates continue to hold when controlling on the right-hand side of the estimating equation for lags of the dependent variable. In that case, also the long-run investment response is significantly different from zero in the hosting countries, and significantly different from the long-run investment response of the bidding countries.

announcement of the host, per capita GDP continues to increase in the hosting countries while in the countries that unsuccessfully bid for the Olympic Games per capita GDP decreases. This is apparent in the top left-hand panel of Figure 2 where we plot the cumulative effects on output growth. Output increases significantly two periods before the announcement of the winner, but output growth starts immediately to fall after the bad “news” of having lost the bid are revealed. On the other hand, for the hosting countries, output growth increases with a faster pace, and, particularly so, for the four years before the celebration of the Games. For the components of output which are displayed in the next three panels the pattern is similar. The cumulative effects on inflation and the exchange rate, displayed in the bottom panels of Figure 2, are also different for hosting and bidding countries.

Results are informative about the nature of the Olympic ‘news’ signal. As mentioned earlier, Olympics bidding might be associated with news about changes in infrastructure; changes in foreign demand through tourism; or structural changes in the degree of openness of the economy. The results confirm the nature of the news have to do with future changes in aggregate supply relative to demand since the effect in the hosting countries turns out to be permanent and quantitatively large.

Also, results provide support for the identification of news shocks proposed by Beaudry and Portier (2006). Blanchard et al. (2010) show that if attention is limited in models in which consumers can perfectly anticipate future shocks the SVAR identification scheme can recover the true news shocks. If we think of the Olympic games bidding as a signal that reveals information about future shocks, it is not surprising to find that the responses of the macroeconomy to Olympics’ news resembles the ones of the economy with news identified through a SVAR using the restrictions of Beaudry and Portier (2006), even though the identification method to recover the shocks is very different.

4. Sensitivity Analysis

We have performed a number of sensitivity tests to ensure that our results are robust. In the paper we report only those estimates that we believe to be more relevant for providing robustness. The other estimates not reported here are reported in a supplementary online appendix that is available for download at <http://sites.google.com/site/markusbrucknerresearch/research-papers.4>

4 In our working paper Bruckner and Pappa (2011) we had reported also estimates of the macroeconomic effects of the International Expositions and the World Cup. Those estimates showed significant ex-ante effects, i.e. macroeconomic

4.1 The Nature of the Experiment

The central assumption in our panel data regressions is that, conditional on fixed country characteristics, the hosting and bidding for the Olympic Games is randomly assigned. If this assignment is indeed random, then we have a natural experiment in hand which allows us to examine the causal effects that an exogenous, but anticipated, shock has on the macroeconomy. The International Olympic Committee (IOC) that is responsible for making the decision of which country will host the Olympic Games states: "only rich countries have the means to make a good return on such a large investment [the Olympic Games]." In the cross-section of countries, the random assignment assumption is thus indeed questionable since only countries which are sufficiently developed have the capacity of hosting the Games. We note, however, that all our regressions control for country fixed effects. Hence, whether countries are developed or not is captured by the country dummies. Indeed, when we estimate equation (1) using only OECD countries the results we obtain are very similar. Those results are reported in Table 3 of the Supplementary Online Appendix.

If the assignment of the Olympic Games is not random and depends on the economic growth performance of the bidding and hosting countries, then the ex-ante coefficients on GDP per capita growth should be different for the hosting and bidding countries. As we have already seen in Panel A of Table 4 this is not the case. Another way to check whether the assignment of the Olympic Games is endogenous to the economic conditions present in the hosting and bidding countries is to test whether bidding countries that during the sample period eventually hosted at least once the Games have a different anticipatory behavior relative to bidding countries that never hosted the Games. In this vein, we re-estimated equation (1), separating the bidding indicator, Bid_{ct} , into two indicators: one indicator, that is unity for those bidding countries that during the sample period eventually hosted at least once the Games; and another indicator that is unity for those bidding countries that despite bidding never hosted the Games. The results are presented in Panel B of Table 4. The main finding is that the data point to no significant difference between successful and unsuccessful bidders. Hence this robustness check fails to provide evidence that, conditional on country fixed effects, countries' economic growth performance determines the IOC's decision on which country will host the Olympic Games.

variables significantly responded in advance before the hosting of the Expo and World Cup. However, in contrast to the Olympic Games, competition in the bidding phase for the Expo and World Cup is limited; hence, these events do not allow us to study anticipations effects and this is the reason why in the current paper those results are not reported.

We can also directly test the randomness of the assignment by examining whether within-country variations in GDP per capita growth have a significant effect on the likelihood of bidding for the Olympic Games. To do so, we report in columns (1) and (2) of Table 7 estimates that regress an indicator variable equal to unity during the year when countries bid to host the Olympic Games on the GDP per capita growth of that particular year. We report estimates from a linear probability model in column (1). In column (2), we report estimates from a conditional logit fixed effects model. We note that while the conditional logit fixed effects model takes into account the binary nature of the dependent variable the estimates produced by this model are not marginal effects.⁵ The main finding in columns (1) and (2) is that both, the linear probability model and the conditional logit fixed effects model show that countries' GDP per capita growth has an insignificant effect on the likelihood of bidding for the Games. Also, it is noteworthy that in quantitative terms the estimates from the linear probability model imply that, at most, a one percentage point higher GDP per capita growth increases the likelihood of bidding for the Olympic Games by 0.007 percentage points. This is, indeed, a very small effect.

In columns (3) and (4) of Table 7 we repeat the exercise for an indicator variable that is equal to unity during the year when a country was selected to host the Olympic Games. In line with our identifying assumption that conditional on fixed country characteristics the Olympic Games are randomly assigned, we find that economic growth has no significant effect on the likelihood of being selected to host the Games. This result holds for both the linear probability model and the conditional logit fixed effects model. And, it holds both for the contemporaneous effect (Panel A) as well as for possible lagged effects (Panel B).

4.2 The Role of Country Characteristics

In Section 3 we found that the announcement of the Olympic Games hosting country generates positive output, investment, private consumption, and government consumption spending responses. An interesting question that we can examine with our panel data is whether the marginal effect of hosting the Olympic Games varies across countries as a function of important features; such as government size, trade openness, political institutions, or geography. These variables have been found to be

5 In general, it is not possible to compute marginal effects from a conditional logit fixed effects model since that would require knowledge of the distribution of the fixed effects (see Wooldridge, 2002).

significant determinants of economic growth in the cross-section of countries. It could, therefore, be also of interest to examine whether these variables induce significant heterogeneity in the marginal effect that hosting the Olympic Games has on output growth across countries.

Table 8 presents the results from a specification where the marginal effect of the Olympic Games is allowed to vary across countries. With the exception of trade openness we find that the interaction estimates are statistically insignificant. Trade openness interacts negatively with the hosting of the Olympic Games. Hence, more open economies seem to gain less from the hosting of the Games. This finding is in line with the results in Rose and Spiegel (2011): it indicates that less open countries have more to gain from hosting the Games. However, there could be multiple reasons for this. One such possible reason that is provided in Rose and Spiegel, is that the Olympic Games lead to countries becoming more open to trade. However, another and equally plausible reason is that in more open economies leakages of demand effects are larger. In fact, it is well understood in macroeconomics that in open economies the size of local demand effects on output is typically smaller than in closed economies.

4.3 Summer vs. Winter Games

In the benchmark model we pool the summer and winter Olympic Games together. Since the winter games are a much smaller event constraining the coefficient estimates to be the same across those games might be misleading.⁶ For that reason we re-estimated equation (1) separating the Olympics into winter and summer games. The results are presented in Tables 9 and 10. The main finding is that the winter games have a smaller effect than the summer games. Nevertheless, the effects of the winter games are still significantly positive and anticipation is confirmed in both events. Rose and Spiegel (2011) find that the winter games alone have no statistically significant impact on international trade levels. Our findings imply that there is much more than openness to trade to gain by hosting the Olympics.

6 The fact that hosts for the winter games are not chosen at random because one needs a mountain with snow on it to qualify as a host (or even to be considered as a serious bidder) is not a problem in our panel fixed effects estimation. The reason is that during the time period we consider, these geographic characteristics of countries are time invariant variables and, therefore, are captured by the country fixed effects.

4.4 Further Robustness Checks

Many economists have shown that stock price movements reflect the market's expectation of future developments in the economy (see e.g. Fama (1990) and Schwert (1990)). Moreover, Beaudry and Portier (2006) use those stock market series to extract news shocks from the data. Given the nature of our exercise and its conclusions it is only natural to ask whether the anticipatory effects for the organization of the Olympic Games are reflected in the movements of the stock market. Using the IFS data on stock price indices, we can examine whether the Olympic bid has significant anticipatory effects on the evolution of stock prices of the hosting and bidding countries. The results that we present in Appendix Table 4 confirm our findings. The anticipatory effects of the Olympics on stock prices are positive and significant eight years before the hosting of the Games for both successful and unsuccessful bidders. And these significant positive responses are of similar magnitude in the two groups of countries.

In Rose and Spiegel (2011) the Olympics carry a signal of trade liberalization and increase the level of exports permanently. In Appendix Tables 5 to 8 we re-examine the effects that the Olympic Games have on exports and imports. Our main finding is that exports and imports significantly increase before the actual hosting of the Olympic Games. This is true for both the bidding and the hosting countries. However, the cumulative effects of hosting and bidding for the Olympic Games on exports and imports are statistically insignificant.

Our baseline estimating equation included up to ten leads of the Olympic Games bidding and hosting indicator. The reason for this is that, during the 1950-2009 period, bidding for the Olympic Games occurred as far as ten years before the actual hosting of the Games. If our main argument of Olympic Games inducing significant anticipation effects is correct then, given the timing in the bidding for the Olympic Games, we should not observe any significant effects of the bidding and hosting indicator further ahead than 10 years before the actual hosting of the Olympic Games. To check this, we re-estimated equation (1) including up to 15 leads of the Olympic Games bidding and hosting indicator. The results from this estimation are presented in Appendix Table 9. The main finding is that the leads for years $t+11$ to $t+15$ are insignificant; both for the bidding and hosting indicator. Hence, this is reassuring evidence that, indeed, our estimation strategy correctly estimates the timing of the anticipatory effect of the Olympic Games.

As a further identification check we repeated the estimation of equation (1) splitting the Olympic Games bidding indicator into: (i) an indicator that is unity for bidding countries that are from

the same continent as the host of the previous Olympic Games; (ii) an indicator that is unity for bidding countries that are not from the same continent as the host of the previous Olympic Games. Appendix Table 10 shows that the effects in these two groups of bidding countries are of similar magnitude. In particular, in both groups there is evidence of a significant effect on output growth eight to ten years before the hosting of the Olympic Games. It is therefore not the case that significant anticipatory effects are absent in bidding countries which are from the same continent as the host of the previous Olympic Games.

Our panel estimates reflect an average effect that the Olympic Games had on output growth over the 1950-2009 period. To examine whether the effects of hosting the Olympics have changed during the most recent decades, we re-estimated equation (1) interacting the hosting indicator variable with a dummy for the post-1990 period. One reason for why the effects could be different for the post-1990 period is the end of the Cold War which led to a significant change in international relations. Other reasons, that could possibly go in opposite directions, include the decline in transportation costs that occurred in the 1980s and 1990s and the increase in competition for hosting the Olympics Games (see Preuss (2004)). Appendix Table 11 shows that the effects of the Olympic Games on output growth are not significantly different for the post-1990 period. Hence, this suggests that the output effects of the Olympics Games are not systematically different for the most recent decades.

In the empirical analysis we have used aggregate data to evaluate the effects of the Olympics. Some of the countries in our sample are large and the organization of a mega-event in one region can have positive spillover effects to other regions in that country. Hence, our results reflect country-wide average effects. To examine also regional effects of hosting the Olympics we obtained data on total real gross per capita state product for the US from the Bureau of Economic Analysis.¹ The USA has hosted five Olympic Games in our sample: the 1960 Winter Olympics in Squaw Valley, CA, the 1980 Winter Olympics in Lake Placid, NY, the 1984 Summer Olympics in Los Angeles, CA, the 1996 Summer Olympics, in Atlanta, GA, and the 2002 Winter Olympics in Salt Lake City, UT. We repeated our analysis by substituting countries with US states. The results are reported in Appendix Table 12 of the online appendix. According to Panel A of Appendix Table 12, hosting the Olympic Games generates increases in GSP growth two years before the actual hosting of the event. GSP growth also increases significantly five years before the hosting of the Olympic Games in unsuccessful bidding countries, thus confirming the presence of anticipation effects (see Panel B). Appendix Table 13 also shows that the delayed effects of hosting the Olympics are considerable and last up to three years after the Games.

At the peak, US states that organized the Olympics saw their gross state product increase by more than three percentage points relative to states that did not undertake the organization of these events. Hence although some caution must be exercised because of the smaller sample, the findings of the baseline analysis are mostly confirmed by the regional data.

A remark regarding standard errors is worthwhile. In all our regressions we clustered standard errors at the country level. The purpose of clustering at the country level is that the computed standard errors are robust to arbitrary within-country serial correlation. To also ensure that our results are robust to arbitrary spatial correlation across countries within any given year (in addition to arbitrary within-country serial correlation) we report in Appendix Table 14 results that cluster standard errors at the country and year level, using the Cameron et al. (2011) multi-cluster estimator. The main result is that using such a multi-cluster estimator produces standard errors that are very similar to those reported in our baseline regressions.

Finally, we have also repeated our exercise using GDP per worker instead of GDP per capita. Results are very similar and are presented in Table 15 of the supplementary online appendix.

5. Conclusions

Starting from Pigou (1926) and Keynes (1936) until the recent work of Beaudry and Portier (2004, 2006, 2007), Jaimovich and Rebelo (2009) and Schmitt-Grohé and Uribe (2012), economists have stressed the importance of expectations in determining the evolution of aggregate macroeconomic data. However, we are not aware of any empirical work that quantifies such effects directly in the data. In the sense that no study has shown so far how the uncertainty about news affects aggregate macroeconomic outcomes and the effects of its resolution. Most of the existing evidence for the presence of anticipation in macroeconomics is indirect. Anticipation effects present serious challenges to empirical research (see also the discussion in Blanchard et al., 2010). Recent studies on the identification of fiscal shocks have shown that anticipation effects might be crucial for determining the effects of such shocks in the macroeconomy (see e.g. Leeper et al. (2012), Mertens and Ravn (2010), or Ramey (2011)).

Beaudry and Portier (2006) estimate the macroeconomic effects of shocks in the stock price index and showed that such shocks cause a boom in the economy. Barsky and Sims (2012), using a different identification strategy contradict their results, raising a debate in the literature on the role of news shocks in aggregate fluctuations. We use the bidding for the Olympic Games as an alternative

way to identify news shocks in the data and we confirm the results of Beaudry and Portier (2006). By taking advantage of the time structure in the bidding for and hosting of the Olympic Games we are able to quantify the effects of anticipatory behavior on macroeconomic aggregates. We find that such effects are economically important and statistically significant. News about Olympic Games makes output and investment surge already at the time of the bidding. In unsuccessful bidding countries the agents' optimism turns out to be unjustified and, as a result, the economy returns to its original trend, while hosting economies enjoy quantitatively large and significant positive effects from hosting. The insignificant and quantitatively small cumulative effect for bidding countries that do not win the Games resembles the Pigou (1927) cycles analyzed in Beaudry and Portier (2004) -- an initial period of over-optimism in response to submitting a potential winning bid is followed by a corresponding decrease in activity when the positive news does not materialize.

Many studies have claimed that hosting the Olympic Games has no measurable economic effects, but these studies concentrate on the delayed or contemporaneous effect. Our results indicate that the anticipatory and ex-ante effects of hosting the Olympic Games on economic growth are statistically significant and economically important. Hence, hosting of the Olympic Games involves more benefits than an "olive wreath", according to Herodotus.

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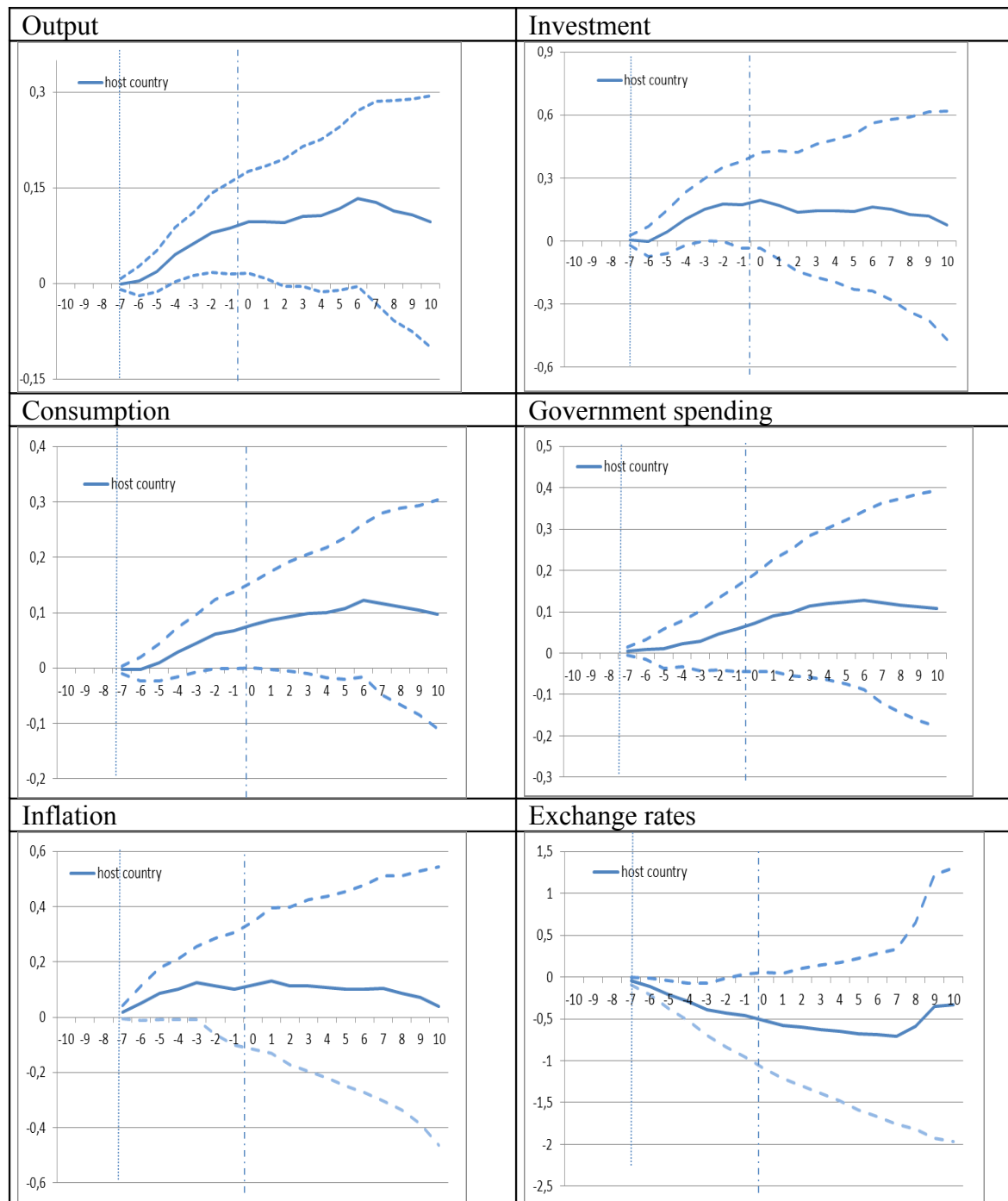


Figure 1: Cumulative Effects Hosting Countries

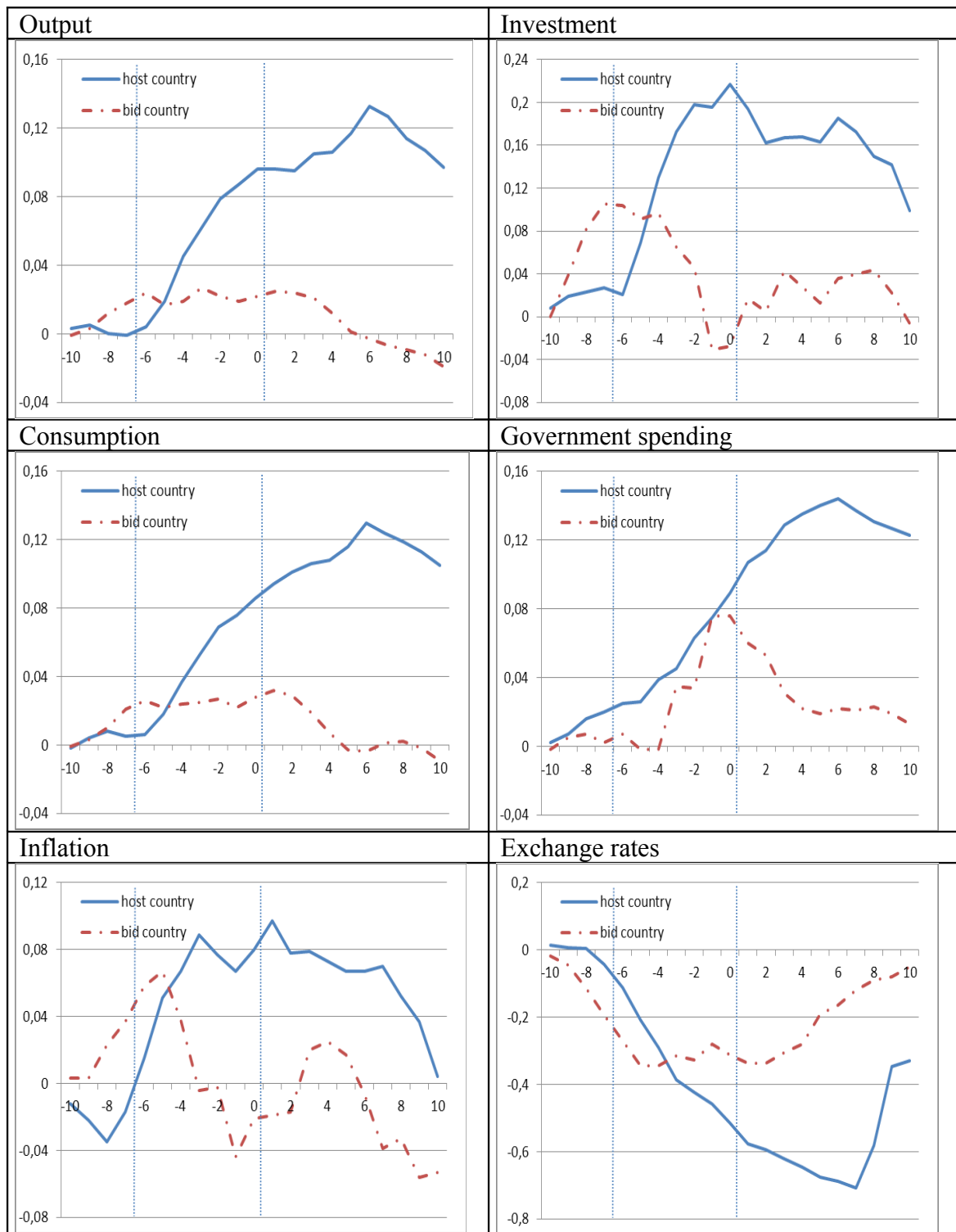


Figure 2: Cumulative Effects Hosting versus Bidding Countries

Table 1. The Contemporaneous and Ex-Ante Effects of Bidding for the Olympics

	$\Delta\text{Log}(\text{GDP})$	ΔLog (Investment)	$\Delta\text{Log}(\text{Private}$ Consumption)	$\Delta\text{Log}(\text{Government}$ Expenditure)	$\Delta\text{Log}(\text{Price}$ Level)	$\Delta\text{Log}(\text{Exchange}$ Rate)
BiddingCountry	0.003 (0.005)	0.003 (0.016)	0.006 (0.004)	0.000 (0.008)	0.023 (0.013)	-0.034 (0.026)
F.BiddingCountry	-0.003 (0.005)	-0.077 (0.043)	-0.005 (0.004)	0.042 (0.036)	-0.042 (0.026)	0.049 (0.041)
F2.BiddingCountry	-0.005 (0.007)	-0.019 (0.014)	0.002 (0.004)	-0.001 (0.006)	0.002 (0.017)	-0.014 (0.032)
F3.BiddingCountry	0.008 (0.005)	-0.032 (0.034)	0.001 (0.005)	0.037 (0.036)	-0.042 (0.032)	0.030 (0.051)
F4.BiddingCountry	0.002 (0.003)	0.006 (0.010)	0.002 (0.004)	-0.000 (0.005)	-0.029 (0.024)	0.000 (0.034)
F5.BiddingCountry	-0.007 (0.004)	-0.013 (0.020)	-0.004 (0.004)	-0.009 (0.014)	0.009 (0.013)	-0.074 (0.042)
F6.BiddingCountry	0.006 (0.006)	-0.001 (0.018)	0.005 (0.005)	0.005 (0.006)	0.021 (0.015)	-0.076 (0.040)
F7.BiddingCountry	0.006 (0.004)	0.023** (0.011)	0.011*** (0.004)	-0.005 (0.013)	0.014 (0.009)	-0.079 (0.045)
F8.BiddingCountry	0.009*** (0.003)	0.043*** (0.011)	0.007** (0.004)	0.002 (0.005)	0.020 (0.013)	-0.069 (0.040)
F9.BiddingCountry	0.004 (0.004)	0.039*** (0.014)	0.004 (0.004)	0.007 (0.006)	-0.000 (0.010)	-0.028 (0.033)
F10.BiddingCountry	-0.001 (0.008)	0.000 (0.028)	-0.001 (0.008)	-0.002 (0.007)	0.003 (0.014)	-0.018 (0.029)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6062	6062	6062	6062	6062	6062
Number of Countries	188	188	188	188	188	188

Note: The method of estimation is least squares. Huber robust standard errors (reported in parentheses) are clustered at the country level. **Significantly different from zero at 95 percent confidence, *** 99 percent confidence.

Table 2. Anticipatory Effects of Bidding for the Olympics

	$\Delta\text{Log}(\text{GDP})$	ΔLog (Investment)	$\Delta\text{Log}(\text{Private}$ Consumption)	$\Delta\text{Log}(\text{Government}$ Expenditure)	$\Delta\text{Log}(\text{Price}$ Level)	$\Delta\text{Log}(\text{Exchange}$ Rate)
All Bidding Countries	-0.002	0.002	-0.002	-0.007	-0.002	-0.013
10 Years Before Hosting	(0.005)	(0.019)	(0.005)	(0.005)	(0.010)	(0.023)
All Bidding Countries	0.003	0.033***	0.003	0.007	-0.010	-0.012
9 Years Before Hosting	(0.004)	(0.010)	(0.004)	(0.005)	(0.007)	(0.021)
All Bidding Countries	0.006*	0.030**	0.008**	-0.002	0.013	-0.053*
8 Years Before Hosting	(0.003)	(0.012)	(0.004)	(0.004)	(0.009)	(0.027)
All Bidding Countries	0.002	-0.001	0.003	0.001	-0.001	-0.041
7 Years Before Hosting	(0.003)	(0.010)	(0.004)	(0.004)	(0.007)	(0.028)
All Bidding Countries	0.002	-0.001	0.002	-0.001	0.014	-0.054**
6 Years Before Hosting	(0.004)	(0.001)	(0.004)	(0.005)	(0.012)	(0.026)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6062	6062	6062	6062	6062	6062
Number of Countries	188	188	188	188	188	188

Note: The method of estimation is least squares. Huber robust standard errors (reported in parentheses) are clustered at the country level. **Significantly different from zero at 95 percent confidence, *** 99 percent confidence.

Table 3. The Contemporaneous and Ex-Ante Effects of Hosting the Olympics

	$\Delta\text{Log}(\text{GDP})$	ΔLog (Investment)	$\Delta\text{Log}(\text{Private}$ Consumption)	$\Delta\text{Log}(\text{Government}$ Expenditure)	$\Delta\text{Log}(\text{Price}$ Level)	$\Delta\text{Log}(\text{Exchange}$ Rate)
HostingCountry	0.009 (0.005)	0.021 (0.013)	0.010** (0.005)	0.014 (0.009)	0.013 (0.017)	-0.058 (0.048)
F.HostingCountry	0.008 (0.006)	-0.002 (0.019)	0.007* (0.004)	0.012 (0.010)	-0.010 (0.018)	-0.033 (0.051)
F2.HostingCountry	0.017** (0.008)	0.025 (0.017)	0.016*** (0.006)	0.018** (0.009)	-0.012 (0.025)	-0.038 (0.061)
F3.HostingCountry	0.017*** (0.004)	0.043*** (0.013)	0.016*** (0.005)	0.006 (0.010)	0.022 (0.014)	-0.095 (0.053)
F4.HostingCountry	0.026*** (0.006)	0.061*** (0.014)	0.019*** (0.007)	0.013*** (0.005)	0.016 (0.010)	-0.082** (0.035)
F5.HostingCountry	0.015** (0.006)	0.048** (0.019)	0.012 (0.007)	0.001 (0.014)	0.036** (0.018)	-0.098** (0.040)
F6.HostingCountry	0.005 (0.009)	-0.006 (0.030)	0.001 (0.009)	0.005 (0.009)	0.032 (0.023)	-0.069** (0.035)
F7.HostingCountry	-0.001 (0.005)	0.004 (0.014)	-0.003 (0.004)	0.004 (0.006)	0.018 (0.015)	-0.046* (0.027)
F8.HostingCountry	-0.005 (0.010)	0.004 (0.026)	0.004 (0.007)	0.009 (0.010)	-0.013 (0.012)	-0.003 (0.034)
F9.HostingCountry	0.002 (0.004)	0.011 (0.015)	0.006 (0.004)	0.005 (0.008)	-0.010 (0.016)	-0.007 (0.021)
F10.HostingCountry	0.003 (0.008)	0.008 (0.024)	-0.002 (0.005)	0.002 (0.006)	-0.012 (0.016)	0.014 (0.024)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6062	6062	6062	6062	6062	6062
Number of Countries	188	188	188	188	188	188

Note: The method of estimation is least squares. Huber robust standard errors (reported in parentheses) are clustered at the country level. **Significantly different from zero at 95 percent confidence, *** 99 percent confidence.

Table 4. Test of Difference: Bidding vs. Hosting Countries; Bidding Countries That Hosted at Least Once the Games vs. Bidding Countries that Never Hosted the Games

		$\Delta\text{Log}(\text{GDP})$	
Panel A: Hosting Countries vs. Bidding Countries		Panel B: Bidding Countries That Hosted at Least Once the Games (HostingCountry_Host) vs. Bidding Countries that Never Hosted the Games (HostingCountry_NeverHost)	
BiddingCountry-HostingCountry	0.45	HostingCountry_Host - HostingCountry_NeverHost	0.60
F.BiddingCountry-F.HostingCountry	0.15	F.HostingCountry_Host - F.HostingCountry_NeverHost	0.71
F2.BiddingCountry-F2.HostingCountry	0.07*	F2.HostingCountry_Host - F2.HostingCountry_NeverHost	0.41
F3.BiddingCountry-F3.HostingCountry	0.05**	F3.HostingCountry_Host - F3.HostingCountry_NeverHost	0.28
F4.BiddingCountry-F4.HostingCountry	0.00***	F4.HostingCountry_Host - F4.HostingCountry_NeverHost	0.97
F5.BiddingCountry-F5.HostingCountry	0.00***	F5.HostingCountry_Host - F5.HostingCountry_NeverHost	0.99
F6.BiddingCountry-F6.HostingCountry	0.97	F6.HostingCountry_Host - F6.HostingCountry_NeverHost	0.61
F7.BiddingCountry-F7.HostingCountry	0.27	F7.HostingCountry_Host - F7.HostingCountry_NeverHost	0.54
F8.BiddingCountry-F8.HostingCountry	0.21	F8.HostingCountry_Host - F8.HostingCountry_NeverHost	0.13
F9.BiddingCountry-F9.HostingCountry	0.70	F9.HostingCountry_Host - F9.HostingCountry_NeverHost	0.63
F10.BiddingCountry-F10.HostingCountry	0.70	F10.HostingCountry_Host - F10.HostingCountry_NeverHost	0.11
Country Fixed Effects	Yes	Country Fixed Effects	Yes
Year Fixed Effects	Yes	Year Fixed Effects	Yes
Observations	6062	Observations	6062
Number of Countries	188	Number of Countries	188

Note: The method of estimation is least squares. The reported p-values on the test of zero difference are based on Huber robust standard errors clustered at the country level. *Significantly different from zero at 90 percent confidence, **Significantly different from zero at 95 percent confidence, *** 99 percent confidence.

Table 5. The Ex-Post Effects of Hosting the Olympics

	$\Delta\text{Log}(\text{GDP})$	ΔLog (Investment)	$\Delta\text{Log}(\text{Private}$ Consumption)	$\Delta\text{Log}(\text{Government}$ Expenditure)	$\Delta\text{Log}(\text{Price}$ Level)	$\Delta\text{Log}(\text{Exchange}$ Rate)
L.HostingCountry	0.000 (0.005)	-0.023 (0.018)	0.008 (0.007)	0.018 (0.011)	0.017 (0.020)	-0.063 (0.034)
L2.HostingCountry	-0.001 (0.007)	-0.032** (0.015)	0.007 (0.006)	0.007 (0.010)	-0.019 (0.013)	-0.015 (0.044)
L3.HostingCountry	0.010 (0.006)	0.005 (0.021)	0.005 (0.006)	0.015 (0.012)	0.001 (0.016)	-0.029 (0.041)
L4.HostingCountry	0.001 (0.006)	0.001 (0.014)	0.002 (0.006)	0.006 (0.007)	-0.006 (0.010)	-0.025 (0.036)
L5.HostingCountry	0.011** (0.005)	-0.005 (0.018)	0.008 (0.006)	0.005 (0.009)	-0.006 (0.015)	-0.030 (0.049)
L6.HostingCountry	0.016*** (0.006)	0.022 (0.019)	0.014** (0.006)	0.004 (0.011)	0.000 (0.014)	-0.012 (0.041)
L7.HostingCountry	-0.006 (0.013)	-0.012 (0.018)	-0.006 (0.016)	-0.007 (0.016)	0.003 (0.019)	-0.020 (0.043)
L8.HostingCountry	-0.013 (0.008)	-0.023 (0.021)	-0.005 (0.008)	-0.006 (0.010)	-0.018 (0.010)	0.128 (0.114)
L9.HostingCountry	-0.007 (0.006)	-0.008 (0.020)	-0.006 (0.007)	-0.004 (0.009)	-0.015 (0.021)	0.234 (0.211)
L10.HostingCountry	-0.010 (0.009)	-0.043 (0.029)	-0.008 (0.011)	-0.004 (0.007)	-0.033 (0.028)	0.018 (0.035)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6062	6062	6062	6062	6062	6062
Number of Countries	188	188	188	188	188	188

Note: The method of estimation is least squares. Huber robust standard errors (reported in parentheses) are clustered at the country level. **Significantly different from zero at 95 percent confidence, *** 99 percent confidence.

Table 6. Cumulative Effects of Hosting and Bidding for the Olympics

	$\Delta\text{Log}(\text{GDP})$	ΔLog (Investment)	$\Delta\text{Log}(\text{Private}$ Consumption)	$\Delta\text{Log}(\text{Government}$ Expenditure)	$\Delta\text{Log}(\text{Price}$ Level)	$\Delta\text{Log}(\text{Exchange}$ Rate)
Panel A: Hosting Country						
Sum of coefficients: L10.HostingCountry to F.10HostingCountry	0.098* (0.056)	0.101 (0.094)	0.105* (0.606)	0.123 (0.099)	0.006 (0.100)	-0.328 (0.670)
Panel B: Bidding Country						
Sum of coefficients: L10.BiddingCountry to F.10BiddingCountry	-0.020 (0.032)	-0.005 (0.083)	-0.010 (0.031)	0.011 (0.031)	-0.052 (0.051)	-0.049 (0.445)
Panel C: Difference Between Hosting Country and Bidding Country						
Difference Between Panel A and Panel B	0.118** (0.060)	0.105 (0.100)	0.115* (0.065)	0.112 (0.085)	0.058 (0.107)	-0.280 (0.700)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6062	6062	6062	6062	6062	6062
Number of Countries	188	188	188	188	188	188

Note: The method of estimation is least squares. Huber robust standard errors (reported in parentheses) are clustered at the country level. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 7. The Effects of GDP Growth on the Likelihood of Bidding for the Olympic Games and Winning the Bid for Hosting the Olympic Games

	Pr(Bidding)		Pr(Winning the Bid)	
Panel A: Contemporaneous GDP Growth Only				
	LS	Logit	LS	Logit
$\Delta\text{Log}(\text{GDP})$	0.007 (0.007)	3.127 (4.336)	0.002 (0.002)	5.002 (8.124)
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	6850	6850	7228	7228
Number of Countries	188	188	188	188
Panel B: GDP Growth Up to 5 Years Lagged				
$\Delta\text{Log}(\text{GDP})$	0.001 (0.002)	5.926 (8.433)	0.005 (0.007)	5.248 (5.981)
L. $\Delta\text{Log}(\text{GDP})$	-0.002 (0.004)	-7.648 (8.563)	-0.002 (0.010)	-7.304 (5.202)
L2. $\Delta\text{Log}(\text{GDP})$	0.000 (0.002)	1.078 (9.778)	-0.005 (0.008)	0.532 (5.398)
L3. $\Delta\text{Log}(\text{GDP})$	0.001 (0.003)	0.513 (8.806)	0.009 (0.007)	6.113 (5.754)
L4. $\Delta\text{Log}(\text{GDP})$	-0.000 (0.002)	-4.792 (9.028)	0.012 (0.008)	7.627 (5.461)
L5. $\Delta\text{Log}(\text{GDP})$	0.005 (0.004)	12.947 (10.117)	-0.007 (0.007)	-5.803 (4.617)
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	6286	6286	5910	5910
Number of Countries	188	188	188	188

Note: The method of estimation in columns (1) and (3) is least squares; columns (2) and (4) maximum likelihood. Reported coefficients in columns (2) and (4) are from a conditional logit fixed effects regression, and do not represent marginal effects. The dependent variable in columns (1) and (2) is an indicator variable that is unity during the year when countries bid to host the Olympic Games. The dependent variable in columns (3) and (4) is an indicator variable that is unity during the year when the country was selected to host the Olympic Games. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 8. The Role of Trade Openness and Other Country Characteristics

	$\Delta\text{Log}(\text{GDP})$				
Sum of coefficients:	0.222***	0.117***	0.148***	0.121**	0.117**
L10.HostingCountry to F.10Hosting Country	[3.41]	[1.99]	[2.80]	[2.23]	[2.03]
Interaction with: Average (EXP+IMP)/GDP	-0.010**				
	[-2.61]				
Interaction with: Average GOV/GDP		-0.009			
		[-0.34]			
Interaction with: Average GDP Per Capita			-0.003		
			[-0.12]		
Interaction with: Average Polity Score				-0.007	
				[0.31]	
Interaction with: North America Indicator					0.105
					[1.04]
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	6062	6062	6062	6062	6062
Number of Countries	188	188	188	188	188

Note: The method of estimation is least squares. t-values [reported in square brackets] are based on Huber robust standard errors clustered at the country level. *Significantly different from zero at 90 percent confidence, ** 95 percent confidence, *** 99 percent confidence.

Table 9. The Contemporaneous and Ex-Ante Effects of Hosting and Bidding for the Winter Olympics

Panel A: Hosting Country	$\Delta\text{Log}(\text{GDP})$	Panel B: Bidding Country	$\Delta\text{Log}(\text{GDP})$
HostingCountry	-0.012 (0.009)	BiddingCountry	0.001 (0.008)
F.HostingCountry	-0.009 (0.011)	F.BiddingCountry	-0.001 (0.006)
F2.HostingCountry	-0.001 (0.007)	F2.BiddingCountry	-0.017 (0.012)
F3.HostingCountry	0.008 (0.007)	F3.BiddingCountry	0.001 (0.005)
F4.HostingCountry	0.021** (0.010)	F4.BiddingCountry	-0.002 (0.005)
F5.HostingCountry	0.006 (0.008)	F5.BiddingCountry	-0.008 (0.005)
F6.HostingCountry	-0.003 (0.013)	F6.BiddingCountry	0.011 (0.008)
F7.HostingCountry	-0.006 (0.007)	F7.BiddingCountry	0.001 (0.004)
F8.HostingCountry	-0.004 (0.010)	F8.BiddingCountry	0.008** (0.004)
F9.HostingCountry	-0.001 (0.006)	F9.BiddingCountry	0.007 (0.005)
F10.HostingCountry	0.002 (0.008)	F10.BiddingCountry	-0.000 (0.007)
Country Fixed Effects	Yes	Country Fixed Effects	Yes
Year Fixed Effects	Yes	Year Fixed Effects	Yes
Observations	6062	Observations	6062
Number of Countries	188	Number of Countries	188

Note: The method of estimation is least squares. Huber robust standard errors (reported in parentheses) are clustered at the country level. **Significantly different from zero at 95 percent confidence, *** 99 percent confidence.

Table 10. The Contemporaneous and Ex-Ante Effects of Hosting and Bidding for the Summer Olympics

Panel A: Hosting Country	$\Delta\text{Log}(\text{GDP})$	Panel B: Bidding Country	$\Delta\text{Log}(\text{GDP})$
HostingCountry	0.028*** (0.007)	BiddingCountry	0.010 (0.006)
F.HostingCountry	0.021** (0.010)	F.BiddingCountry	0.001 (0.007)
F2.HostingCountry	0.034*** (0.013)	F2.BiddingCountry	0.005 (0.005)
F3.HostingCountry	0.021*** (0.007)	F3.BiddingCountry	0.008 (0.005)
F4.HostingCountry	0.020*** (0.007)	F4.BiddingCountry	0.003 (0.005)
F5.HostingCountry	0.016 (0.012)	F5.BiddingCountry	-0.004 (0.006)
F6.HostingCountry	0.017 (0.010)	F6.BiddingCountry	0.003 (0.007)
F7.HostingCountry	-0.003 (0.006)	F7.BiddingCountry	0.011** (0.005)
F8.HostingCountry	-0.019 (0.017)	F8.BiddingCountry	0.011** (0.005)
F9.HostingCountry	0.000 (0.005)	F9.BiddingCountry	0.001 (0.007)
F10.HostingCountry	-0.001 (0.011)	F10.BiddingCountry	0.001 (0.012)
Country Fixed Effects	Yes	Country Fixed Effects	Yes
Year Fixed Effects	Yes	Year Fixed Effects	Yes
Observations	6062	Observations	6062
Number of Countries	188	Number of Countries	188

Note: The method of estimation is least squares. Huber robust standard errors (reported in parentheses) are clustered at the country level. **Significantly different from zero at 95 percent confidence, *** 99 percent confidence.

Data Appendix Table 1: List of Bidding and Hosting Countries

Bidding Countries	Year	Bidding Countries	Year	Hosting Countries	Year
Argentina	1956	Malaysia	2008	Australia	1956
Argentina	1968	Mexico	1956	Australia	2000
Argentina	2004	Mexico	1960	Austria	1964
Australia	1992	Netherlands	1952	Austria	1976
Australia	1996	Netherlands	1992	Bosnia and Herzegovina	1984
Australia	2006	Norway	1968	Canada	1976
Austria	1960	Norway	1992	Canada	1988
Austria	1964	Poland	2006	China	2008
Belgium	1960	Russia	1976	Finland	1952
Belgium	1964	Slovak Republic	2006	France	1968
Bulgaria	1992	South Africa	2004	France	1992
Bulgaria	1994	Spain	1972	Germany	1972
Canada	1956	Spain	1998	Greece	2004
Canada	1964	Spain	2008	Italy	1956
Canada	1968	Sweden	1964	Italy	1960
Canada	1972	Sweden	1968	Italy	2006
Canada	1976	Sweden	1972	Japan	1964
Canada	1996	Sweden	1984	Japan	1972
Canada	2002	Sweden	1988	Japan	1998
Canada	2008	Sweden	1992	Korea, Republic of	1988
Cuba	2008	Sweden	1994	Mexico	1968
Egypt	2008	Sweden	1998	Norway	1952
Finland	1964	Sweden	2002	Norway	1994
Finland	1968	Sweden	2004	Russia	1980
Finland	1972	Switzerland	1960	Spain	1992
Finland	1976	Switzerland	1976	United States	1960
Finland	2006	Switzerland	2002	United States	1980
France	1968	Switzerland	2006	United States	1984
France	1992	Thailand	2008	United States	1996
France	2008	Turkey	2000	United States	2002
Germany	1960	Turkey	2008		
Germany	1992	United Kingdom	1992		
Germany	2000	United Kingdom	1996		
Greece	1996	United Kingdom	2000		
Hungary	1960	United States	1952		
Italy	1952	United States	1956		
Italy	1988	United States	1960		
Italy	1992	United States	1964		
Italy	1998	United States	1968		
Italy	2004	United States	1972		
Japan	1960	United States	1976		
Japan	1968	United States	1980		
Japan	1984	United States	1992		
Japan	1988	United States	1994		
Japan	2008	United States	1998		