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

Abstract: Recent analyses relate increases in the growth rate of countries to anticipation effects caused by bidding for the Olympic Games, so called news shocks. We argue that these findings should be interpreted cautiously. First, these analyses may suffer from an omitted variable bias because they neglect key determinants of economic growth. Second, these analyses compare the bidders for the Olympic Games to all other countries in the world, which constitutes a comparison between groups that show large differences in their structural characteristics. We show that including established determinants of economic growth and comparing the bidders to a suitable control group may lead to a complete disappearance of the anticipated economic effects of Olympic Games.

Keywords: Anticipated shock, Olympic Games, GDP growth, matching, mega event

JEL classification: E62, E65, F1, L83

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1 Introduction

Recently, Brückner and Pappa [BP] (2015) borrowed from the news shock literature (Beaudry & Portier, 2004, 2006; Davis, 2007; Schmitt-Grohé & Uribe, 2012) to analyze the economic effects of bidding for (or hosting) the Olympic Games on several macroeconomic indicators. They argue that both the decision to apply for the Games, as well as the selection as a host city, constitute a news shock, which increases investment, consumption, and output significantly nine to seven years before the actual event in bidding countries. For Olympic hosts, they also find positive effects three to five years preceding the games. Furthermore, the coefficients estimated by BP would indicate that the anticipation of bidding for the Olympic Games eight years before the celebration of the games significantly increases per capita GDP growth by 0.99 percentage points.

* We thank Markus Brückner for generously providing data and code to replicate Brückner and Pappa (2015).

BP's results contrast with most literature on the economics of mega sport events. This literature primarily finds no evidence for measurable economic impacts of the Olympic Games. These results hold across geographical units (e.g., cities, counties, Metropolitan Statistical Areas, and states), model specifications, estimation methods, and dependent variables (e.g., employment, wages, and taxable sales) (Coates & Humphreys, 2008). One of the few "positive" studies, Rose and Spiegel (2011), suffers from an inappropriate treatment methodology (Maennig & Richter, 2012).

We argue that the BP results should be interpreted cautiously. First, the BP analysis does not consider well-established determinants of economic growth, leading to a potential omitted variable bias. Second, the BP analyses compare the economic performance of countries such as Australia, Canada, France, Germany, Japan, United Kingdom, and the United States that bid for Olympic Games to all other countries in the world, including much less-privileged countries such as Uganda, Burundi, and Tanzania. Therefore, the results may suffer from selection bias.

To address the first problem, we refer to the literature on economic growth, which identified investment growth, government spending growth, fertility, life expectancy, and human capital, among others, as key determinants (Barro, 1991, 2003). We tackle the second problem by employing a matching procedure. We use propensity score matching to identify countries that are structurally similar to the bidding and hosting countries, but are not bidders themselves.

We find that including the determinants of economic growth or matching bidders/hosts to a suitable control group reduces the economic effects of Olympic Games. Combining both approaches eliminates all significant effects. We also find that these results are robust to the inclusion of a substantially revised data set.

2 Empirical strategy and results

Parallel to BP, we rely on data from the Penn World Table (PWT), version 7.0 as described in Heston et al. (2011), for the period 1950-2009. We extend these data by including standard determinants of economic growth from the World Bank (2011) including the fertility rate, life expectancy at birth, the stock of human capital (share of tertiary

schooling), the degree of international openness, a measure of political stability, as well as the change in the terms of trade.

The baseline empirical strategy is in accordance with BP. To maintain a short presentation, we restrict ourselves to the effects on GDP per capita growth. Olympic bidders and hosts are denoted as 1 in the respective year and enter the equations with 10 lags and leads to capture possible effects. We also include the lagged values of the GDP growth rate and of government spending, as well as country level fixed effects and a full set of year fixed effects. Table 1 summarizes our main results. Column (1) contains the replicated results from BP.

To overcome the problem that the BP regression compares bidders and hosts for the Olympic Games to all other countries, we use the propensity score procedure of Rosenbaum and Rubin (1983). The covariates used for the estimation of the propensity score are required to affect the outcome variable (i.e., GDP growth) and the probability to become a bidder for the Olympic Games; they should preferably be measured before the treatment or not vary over time (Caliendo & Kopeinig, 2008). Because we attempt to base the matching on the earliest possible year with as many available countries as possible, we face a tradeoff between lower data availability in the 1950s and the possibility that later outcomes may previously be influenced by participation in the Olympic Games. We select the year 1970, and include as covariates the five year lagged values of GDP, government spending, investment, consumption, and the population. We match the bidding countries using nearest neighbor matching and obtain a sample in which the structural differences between the bidders and the remaining countries are substantially reduced.¹ Column (2) reports the results for the restricted sample of countries, which were matched to the Olympic bidders. The Olympic effects are slightly

¹ The bidding countries include Argentina, Australia, Austria, Belgium, Bulgaria, Bosnia and Herzegovina, Canada, Switzerland, China, Cuba, Egypt, Spain, Finland, France, UK, Germany, Greece, Hungary, Italy, Japan, South Korea, Mexico, Malaysia, Netherlands, Norway, Poland, Russia, Slovak Republic, Sweden, Thailand, Turkey, the US, and South Africa. The matched countries include Bolivia, Brazil, Barbados, Costa Rica, Denmark, Ecuador, Guatemala, India, Ireland, Iceland, Israel, Jamaica, Jordan, Kenya, Luxembourg, Namibia, Nigeria, New Zealand, Puerto Rico, Portugal, El Salvador, Seychelles, Syria, Uruguay, and Venezuela.

lower. Most notably, the variance explained by the model is doubled compared with the R2 of BP of 0.12.

Next, in accordance with a standard literature reference on economic growth (Barro, 1991, 2003), we include the lagged growth of investment, the price level, the share of tertiary schooling, 1/life expectancy at birth, the fertility rate, the ratio of government consumption to GDP, the openness ratio, the change in the terms of trade, and the polity2 score as a measure for the institutional quality. Column (3) reports the results for the full (non-matched) sample for the years 1960-2009.² This specification reduces the Olympic hosting effects as well as the bidding effects.

Column (4), reports the results of a regression that both a) controls for the usual determinants of economic growth and b) restricts the sample to countries that match Olympic bidders/ hosts. The combination of these two simple perturbations reduces all anticipated effects beyond significance. The variance explained by our model is tripled compared with BP.

Finally, we use the recently substantially revised PWT 8.1 data set as a further robustness check.³ The PWT revision implies certain fundamental changes to selected data series. Figure 1 in the appendix illustrates some of these changes. Again, using our Barro-augmented model with matching countries, no significant Olympic effects can be identified (Column 5). Although the goodness of fit fails to meet model (4), the results are appealing because the coefficients of the structural variables are close to Barro (2003).

² Because the World Bank data are only available since 1960 and for a slightly different subset of countries, this leads to a reduction in sample size.

³ Feenstra et al. (2015) describe the new version of the Penn World Table for the period 1950-2011 and explain some of the differences between the data sets.

Tab. 1 Anticipation effects of hosting and bidding for the Olympic Games

	(1)	(2)	(3)	(4)	(5)
	$\Delta \log(\text{GDP})$	$\Delta \log(\text{GDP})$	$\Delta \log(\text{GDP})$	$\Delta \log(\text{GDP})$	$\Delta \log(\text{GDP})$
L. $\Delta \log(\text{GDP})$	0.0147 (0.0301)	0.0890 (0.0499)	0.0166 (0.0489)	0.115 (0.0779)	0.184 (0.0723)
L. $\Delta \log(\text{gov})$	0.00494 (0.0105)	0.0510 (0.0280)	-0.0215 (0.0166)	0.0158 (0.0409)	-0.00218 (0.0326)
L. $\Delta \log(\text{investment})$			0.00642 (0.00975)	-0.0107 (0.0206)	0.0152 (0.0203)
L. $\Delta \log(\text{cpi})$			0.0172 (0.0127)	0.0343 (0.0157)	0.00407 (0.0255)
Schooling			-0.0405 (0.0201)	-0.0260 (0.0186)	0.000437 (0.0240)
1/Life expectancy			0.00243 (1.941)	2.035 (3.405)	-3.490 (5.181)
Fertility rate			-0.660 (1.148)	-0.953 (1.035)	-0.234 (1.577)
Openness ratio			-0.0239 (0.0456)	-0.114 (0.0479)	-0.0489 (0.0495)
Democracy			3.257 (2.172)	-3.429 (1.798)	18.64 (3.264)
Change in terms of trade			0.0166 (0.0489)	-0.439 (0.702)	0.184 (0.0723)
Bidding Country	0.291 (0.553)	-0.144 (0.691)	0.708 (0.660)	-0.241 (0.786)	-0.305 (0.963)
F.Bidding Country	-0.302 (0.473)	-0.0633 (0.473)	-0.685 (0.761)	-0.703 (0.860)	-0.901 (0.856)
F2.Bidding Country	-0.522 (0.751)	-0.638 (0.918)	-0.911 (0.753)	0.614 (0.611)	-1.643 (1.125)
F3.Bidding Country	0.776 (0.355)	0.797 (0.351)	0.274 (0.532)	0.0959 (0.504)	-0.162 (0.704)
F4.Bidding Country	0.238 (0.309)	0.215 (0.342)	0.421 (0.531)	-0.748 (0.612)	0.401 (0.675)
F5.Bidding Country	-0.676 (0.436)	-0.751 (0.484)	-0.0747 (0.635)	0.165 (0.932)	-1.016 (1.005)
F6.Bidding Country	0.603 (0.589)	0.229 (0.669)	0.623 (0.958)	0.233 (0.513)	-0.283 (0.984)
F7.Bidding Country	0.530 (0.345)	0.659 (0.307)	0.267 (0.536)	0.493 (0.417)	0.0871 (0.468)
F8.Bidding Country	0.981 (0.327)	0.829 (0.359)	1.439 (0.503)	0.620 (0.572)	0.690 (0.435)
F9.Bidding Country	0.417 (0.432)	0.606 (0.363)	0.887 (0.627)	-0.509 (0.787)	0.289 (0.677)
F10.Bidding Country	-0.0720 (0.745)	-0.204 (0.697)	-0.217 (0.876)	1.121 (0.738)	-0.505 (0.649)
F.Hosting Country	0.904 (0.654)	0.768 (0.575)	1.518 (0.982)	1.704 (1.167)	0.000523 (0.829)
F2.Hosting Country	1.839 (0.838)	1.602 (0.755)	2.391 (1.291)	0.831 (0.638)	1.502 (1.065)
F3.Hosting Country	1.731 (0.360)	1.617 (0.333)	1.241 (0.694)	0.747 (0.759)	-0.123 (0.937)
F4.Hosting Country	2.620 (0.571)	2.412 (0.610)	1.461 (0.737)	0.799 (0.613)	0.731 (0.712)
F5.Hosting Country	1.443 (0.628)	1.269 (0.538)	1.118 (1.132)	0.397 (1.284)	0.275 (0.671)
F6.Hosting Country	0.650 (0.933)	0.282 (0.896)	1.037 (1.329)	0.470 (0.626)	0.125 (1.255)
F7.Hosting Country	-0.0441 (0.477)	0.0653 (0.437)	0.201 (0.522)	-1.703 (1.908)	0.134 (0.757)
F8.Hosting Country	-0.379 (0.988)	-0.386 (0.945)	-1.336 (1.754)	0.129 (0.508)	-1.832 (2.002)
F9.Hosting Country	0.329 (0.344)	0.296 (0.290)	0.381 (0.526)	0.211 (0.726)	-0.740 (0.961)
F10.Hosting Country	0.612 (0.806)	0.625 (0.805)	0.296 (0.811)	0.115 (0.0779)	-0.609 (1.008)
Observations	5866	2517	2414	1106	1169
R ²	0.118	0.225	0.172	0.353	0.217
AIC	41245.5	15711.7	16140.4	6288.2	6925.9
Barro			YES	YES	YES
Matching OECD		YES		YES	YES
PWT 7.0	YES	YES	YES	YES	
PWT 8.1					YES

Notes: Standard errors in parentheses are clustered on the country level in all models. * p < 0.1, ** p < 0.05, *** p < 0.01.

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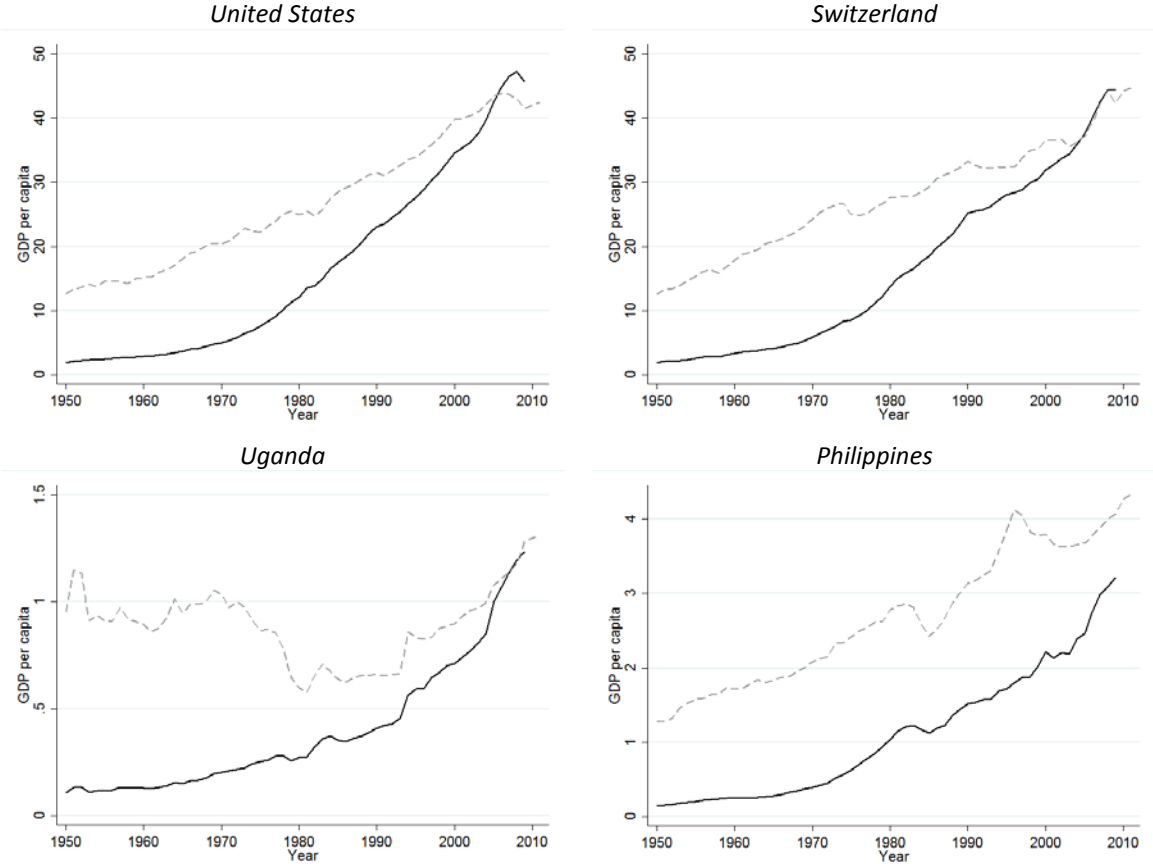
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Appendix

Fig. 1 Comparison of data: PWT 7.0 versus PWT 8.1



Notes: Illustration of differences between PWT 7.0 and PWT 8.1 for data on GDP per capita (in millions US\$) using the examples of the United States, Switzerland, Uganda, and the Philippines. Solid lines denote baseline data PWT 7.0, dashed lines denote revised data PWT 8.1.

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