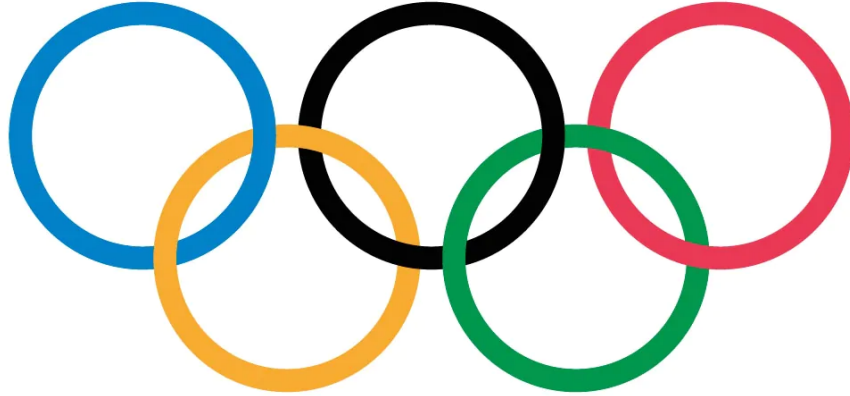


# The Economic Impact of the Olympics



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## Abstract

The Olympics Games are massive sporting events that take place every 4 years, bringing teams from many countries to compete for glory. What impact do these games have on the host countries' economy? Nine tables were created to track the change in selected macroeconomic indicators in the years relative to the Olympics. Along with the tables, several graphs were produced to show how these indicators may have fluctuated in the years of the Olympics. Finally, a cost benefit analysis was conducted highlighting some of the benefits and costs that a city/country may incur. Overall, there was not enough evidence to make a definite conclusion; but there has been an increasing trend in cities withdrawing their Olympic bid.

# Introduction

The Olympic Games are considered to be a major international sporting event and are held every four years. There is a Winter and Summer Olympics. Both interchanging every two years. The games are the most important multisport competitions across the globe with thousands of athletes participating each year and millions of spectators traveling to the host nation. This study explores whether the Olympics have an impact on the host country's Macroeconomic indicators.

Major cities across the globe are raffled to be chosen as the next host city. Even to enter the raffle is extremely expensive as it is. Wills (2021) illustrates how the past decades of Olympics have seen bids range from \$50 Million to \$150 Million. Japan bid \$100 Million on the 2016 Olympics to lose, and \$75 Million for the 2020 Olympics. Flyvbjerg & Stewart (2012) point out that in 2005 for London's bid to host the 2012 Olympics, their baseline cost added up to 15.62 billion Euros; 7.2 Billion of which went to road's and railway development. In each chosen Olympics host city, stadiums are built and jobs are temporarily created. Moreover, cities like Sydney recorded a revenue of \$2.3 Billion from broadcasting rights, sponsorships, and ticket sales alone. This may seem like a positive development, but once the Games are over and there are no crowds to fill the stadiums with and no work to give to all the hired workers; this positivity might be short-lived.

Some countries, like the United States, which hosted the Olympics saw a boom in production within the city and it was looked upon fondly. Most other host cities did not experience the same boom. In cities like Rio, the debt is driven up immensely and stadiums are built; in 2014, Rio built 15,000 hotels that are virtually not used anymore. Even in the time of usage at Rio 2014, athletes and fans were complaining of the facilities' bad and unsanitary conditions.

To analyze the macroeconomic indicators prior and after the Olympics, I collected the data on host countries' GDP per capita, labor force participation rate, exports, CPI, PPI, and other.

This topic is important because the games have major implications for the people living in the host city, and the effect can expand outward. Spending massive amounts on sports stadiums may have been better suited to infrastructure that benefits the society more. Public funds such as taxpayer dollars are the main source of money for Olympic Games expenses. With that, domestic businesses are affected, price levels, tourism, etc. Whether it is positive or negative seems to depend on the country, the trend among Olympics shows an overall positive effect but the years after is when it varies.

There may be many alternate uses to these massive infrastructure projects. Including a secondary use for massive stadiums after the games, analysis of a city's income, economy, and readiness to pay back any borrowed money, and any other solutions that can be found through the course of this paper.

## Literature Review

My research builds upon previous work that has examined the economic impact of the Olympics. The literature uses different approaches but almost all papers utilize a cost/benefit analysis. Some through an empirical review; Czura et al. (2020) explore the effects of the Olympic Games on tourism and GDP. Massiani (2018) examines multiple mega-events such as the World Cup and the Olympics, to estimate their effects on multipliers from his CGE study, consumer response, funding mechanisms, multipliers on different funding mechanisms and productivity.

Engelhardt et. al. (2018) questions whether the Olympics increases profits of publicly traded companies in the regions. They find that companies are only affected when a country announces that they are hosting the Olympic games. This may need to be looked into further, as some domestic businesses in countries like the UK and China may benefit much greater than domestic businesses in countries such as South Korea and Greece.

Baade and Matheson (2016) analyze several aspects from all of the modern Olympics. One of their first tables shows a dramatic drop off in bidding countries

in the past 25 years. Industrialized countries have stopped placing bids, with concerns of misallocation of funds and overspending. They find the effect to be negative overall, yet some countries continue to place bids; leading the authors to believe economic effects could be of secondary concern.

Other sources look at various economic indicators to analyze the effect of the Olympics. McBride (2018) looked at all of the modern Olympics dating back to 1896, he specifically highlights that the 2016 Rio de Janeiro Olympics emphasized the “ongoing debate of the cost and benefits of hosting”. Flyvbjerg & Stewart (2012) state that every Olympics since 1960 has seen major cost overruns. They collect the data on the overall stated cost of each Olympics dating back to 1960. For example, Atlanta in 1996 saw 147% cost overrun, and Lillehammer 1994 saw 277% cost overrun.

Li et. al. (2012) conducts an empirical review of the 2008 Beijing Olympics, finding that its effect on tourism creates a demand shock because of the increased price of traveling to the host country during this time period; the changes in real tourism consumption was less than the international demand of tourism.

Scandizzo & Pierleoni (2017) distinguish the ex-ante (before the Olympics) empirical studies and the ex-post (after the Olympics), noting that the both vary when studies are created . They split up the positive and negative impacts each falling into one of the categories: economic, environmental, sociocultural, psychological, and political. The positive impacts include rise in income, construction of new facilities, increase in notoriety to tourists, increase in pride in the nation, and increase in public-private relationships. The negative include: high cost, tax increase, abandoned stadiums, environmental damage, architectural pollution, etc. The list of negatives is not extensive but some of them are major problems that could create a domino effect of other issues.

Scandizzo & Pierleoni (2017) also analyzed the positive and negative induced effects that the Olympics may have. The effects are all measured in different categories: economic impacts, environmental, sociocultural, political, etc. Some negative effects they report on the economic side are high costs, tax increases, better investments elsewhere. Positives include job creation, rise in income, etc.

Overmyer (2017) conducts a cost/benefit analysis and finds that almost every Summer Olympics since 1996 the host country greatly underestimated the cost of

expenses. The positives that he finds are very similar to Scandizzo & Pierleoni (2017). Overmyer concludes that it was worth it for some of the countries such as the United States and China, but not for the others such as Greece that saw massive sunk costs. Which then begs the question of why more established, wealthier countries have more benefits than lower income, and overall smaller countries like Greece, South Korea, and Australia.

Increased tourism is a big attractor to countries looking to place a bid in the Olympics. Czura et. al. (2020) do not find any significant change within tourism and GDP. Massiani (2018) points out the fact that the massive amount of money that is spent on infrastructure would not be there if the city was not hosting. Scandizzo & Pierleoni (2017) found that the Sydney games increased Australia's international profile and brand. One may think of Beijing's extravagant starting ceremony in 2008 when thinking of the city, it is very helpful for the tourism of the Country. Tourism is a facet of the games that is looked at by almost every author of the Olympics impact studies. The Olympics have an enormous impact on tourism, not only for the time that the games will be held; but for many years to come after. It gives a host city a chance to show off its' beauty, and in turn it works to the advantage of the country as a whole.

Many authors like Flyvbjerg & Stewart (2012) show that countries can see massive amounts of overrun costs, which can put a country into a big hole that they may just keep digging themselves in. They estimated that the average cost overrun for the Summer Olympics is 252%, and for the Winter's is 135%. McBride (2018) points out that the massive price tag on these games has risen significantly in the past 20 years, \$13 Billion cost in Pyeongchang 2018 and over \$50 Billion in Sochi 2014. These costs have seen cities like Boston and Stockholm withdrawing future bids for Olympic games to avoid footing the massive bill. All of the previous work done before me contributed to the "Value" of the critical evaluation; adding to the understanding of this topic.

Scandizzo & Pierleoni (2017) note that countries do not just seek out the Olympics for its supposed economic value, but also that of the value of cultural worldwide celebrations. This is an event that is seen all over the world, and affects a great amount of people, not just in an economic way. It can also sometimes make or break a city/country's hopes of improving the standard of living through the bidding of the Olympics. These positive impacts are seen through increased

investment in the host city, increased tourism, increased expenditure, and a list of many other things. After the 2016 Rio De Janeiro Olympics, it made it clear that the economic impact is not all positive. Many can argue that Rio is still facing problems and hardships today from those games.

## Methodology

I took data primarily from the FRED website, other data sources included Worldbank.org, tradingeconomics, and OECD. I collected data from each Olympic games dating back to 2000, Pyeongchang 2018 and Tokyo 2020 were not included because of how recent the games took place. COVID-19 also had a significant impact on all of these economic indicators that would skew data. I took several economic indicators such as GDP per capita, labor force participation rate, exports, CPI, PPI, and more. I analyzed the impact of the Olympics on these factors 5 years prior to the games, and 5 years after. My methodology included data collection for all of the reviewed indicators. With that data, I was able to create the tables above and see the impact in a clearer way. The previous year was subtracted from each year to show the change in each economic indicator for each Olympics. At the bottom of the pivot tables you can see an average of each indicator for the 5 years prior to the Olympics; and the 5 years after. Along with this, several graphs to show some basic summary statistics were needed to convey the impact in a clearer way. Finally, with all the data collected, the cost/benefit chart above was created to put everything into one place. The costs and benefits were tallied to give a much clearer picture of the data that was collected. Showing that the impacts are there, but whether it is positive or negative is the more complicated question to answer.

## Data

The US and Australia saw increases in almost every category prior to and following the events (Tables 1 and 2). As discussed in the last paragraph, not all increases are positive as well. Producer and consumer prices saw overall increases.

Interest rates saw an increase in both countries in the “average after” category. GDP per capita was not completely similar, as the USA saw steady growth; but they both experienced an increase the year of the Olympics.

SYDNEY 2000 Years relative to the Olympics	GDP Per Capita		Labor Force Participation Rate	Exports: Value Goods (in Billion USD)			Home Ownership Rate	Interest Rates	Consumer Confidence
		% Change in GDP Per Capita			CPI	PPI			
-5	2,273.47	12.59808181	0.007	0.493	2.14	2.11	0	2.75	35
-4	1,541.70	7.587244453	0	0.674	2.23	1.35	0	0	-15
-3	1,607.26	7.352068698	-0.003	0.317	0.83	0.38	0	-1.5	5
-2	-2,149.63	-9.15960439	0	-0.507	-0.09	0.58	0	-1	-7
-1	-785.92	-3.686483768	-0.003	-0.052	0.74	-0.48	0.5	-0.25	12
0	1,146.21	5.582271305	0.004	0.574	1.77	3.66	0	0.25	-10
1	-2,188.39	-10.09439902	0	0.01	3.9	3.56	0	1.25	0
2	591.62	3.035371451	-0.001	-0.007	2.05	0.28	0	-2	-15
3	3,364.55	16.75365791	0.003	0.63	2.31	2.21	-0.6	0.5	28
4	6,983.65	29.78479577	0	1.099	1.49	-0.86	0	0.5	0
5	3,568.56	11.72684935	0.008	1.254	1.77	4.42	0	0	-15
Average Before	497.38	2.938261361	0.0002	0.185	1.17	0.788	0.1	0	6
Average After	2,464.00	10.24125509	0.002	0.5972	2.304	1.922	-0.12	0.05	-0.4

Table 1. Sydney 2000

SALT LAKE 2002 Years relative to the Olympics	GDP Per Capita		Labor Force Participation Rate	Exports	CPI for all Urban Consumers		Home Ownership Rate	Interest Rates	Consumer Confidence
		% Change in GDP Per Capita			PPI				
-5	1,471	5.019278671	0.006	70.434	4.7	3.4	0.3	0.1	5
-4	1,470	4.7761388	0.001	44.647	2.6	-4.3	0.5	0.05	-12
-3	1,594	4.942942198	0.001	-2.257	2.7	-2.5	0.8	-1.04	12
-2	1,714	5.064712487	0.001	92.14	4.6	5.4	0.4	0.63	5
-1	1,655	4.654629317	-0.001	43.91	6.3	11.7	0.4	-0.02	-5
0	371	0.997017011	-0.007	-127.655	2.1	-11.5	0.3	-3.87	-20
1	1,002	2.666169975	-0.001	35.04	4.9	6.8	0.5	-0.42	-11
2	2,217	5.745905038	-0.003	109.47	3.7	6.1	0.3	-0.18	24
3	2,484	6.088086076	-0.003	144.74	5.3	9.5	0.5	1.3	-8
4	2,390	5.52154326	0.002	155.56	7.7	13.4	-0.6	3.26	-20
5	1,614	3.53366174	0.004	164.02	4.173	-0.3	-0.1	0.75	8
Average before	1,581	4.891540295	0.0016	49.7744	4.18	2.74	0.48	-0.056	1
Average after	1,941	4.711073218	-0.0002	121.77	5.1546	7.1	0.12	0.942	-1.4

Table 2. Salt Lake 2002

Labor force participation rates don't seem to be a big change but that -0.007 change in the rate means thousands to even millions of people dropped out of the labor force, or vice versa. Sydney had little data on their home ownership rate, but the US had significant positive changes in the years leading up to the Olympics and a few years after. The consumer confidence category is relatively similar for both countries, many saw the consumer confidence among the people decrease during the Olympics. This shows a growing trend that bigger, or more developed countries seem to show less of a negative impact, and costs are less of a worry.

ATHENS 2004 Years relative to the Olympics	GDP Per Capita (in USD)	% Change in GDP Per Capita	Activity Rate: All persons age 15-74	Exports: Value Goods (in Billion Euro)	CPI	PPI (Investment Goods)	Home Ownership Rate	Interest Rates	Consumer Confidence
-5	-181.94	-1.355017789	0.71	0.007	-2.029	-1.202	0	-4.73	5
-4	-1,202.24	-9.076804485	-0.58	0.257	0.414	-0.176	0	0.3	17
-3	495.23	4.112198423	-0.49	0.082	0.222	-1.604	0	-1.25	-12
-2	1,572.13	12.53874167	0.18	-0.166	0.256	1.353	0	-0.11	0
-1	4,367.27	30.95091461	1.11	0.06	-0.098	0.358	0	-0.81	-10
0	3,477.52	18.82021347	1.08	-0.004	-0.632	0.341	75.3	-0.06	-15
1	596.63	2.717500717	0.17	0.006	0.646	-1.429	-75.3	-0.68	15
2	2,249.43	9.974534104	0.45	0.286	-0.349	0.002	0	-0.09	-19
3	4,026.17	16.23379713	0.03	0.152	-0.301	0.768	75.6	0.68	16
4	3,169.95	10.9953405	0.19	0.136	1.257	-0.655	0	0.12	-12
5	-2,286.31	-7.14533191	0.63	-0.34	-2.942	-0.795	1.1	1.2	-10
Average Before	1,010.09	7.434006486	0.186	0.048	-0.247	-0.2542		-1.32	0
Average After	1,551.17	6.555168108	0.294	0.048	-0.3378	-0.4218	0.28	0.246	-2

Table 3. Athens 2004

TURIN 2006 Years relative to the Olympics	GDP Per Capita (in USD)	% Change in GDP Per Capita	Labor Force Participation Rate	Exports (in Billion Euro)	CPI	PPI	Total Construction	Home Ownership Rate	Interest Rates	Consumer Confidence
-5	395.62	1.969474686	1.812	7.326	0.248	2.2	1.01	0	-0.57	-2
-4	1,786.93	8.723876775	0.002	-1.063	-0.32	-0.1	-1.91	0	-0.04	5
-3	5,195.54	23.32962433	-0.003	-0.168	0.207	1.9	-3.36	0	-0.76	-10
-2	3,794.03	13.81371224	-0.005	1.25	-0.466	0.5	2.78	71	-0.06	-8
-1	783.43	2.506197274	-0.004	5.382	-0.221	3.6	-1.91	1.7	-0.61	-2
0	1,458.52	4.551738687	0.002	9.274	0.106	3.3	8.37	0.5	-0.17	5
1	4,321.00	12.89786834	-0.003	9.521	-0.262	1.7	-8.35	-0.3	0.72	3
2	2,955.68	7.814574649	0.004	6.48	1.519	5.6	-3.24	0.3	0.14	-5
3	-3,698.58	-9.069962142	-0.006	-25.646	-2.573	-3.4	1.16	-0.4	0.22	-6
4	-1,079.24	-2.91059058	-0.003	5.704	0.75	1.7	-0.55	0	-0.54	13
5	2,598.54	7.21806796	0	14.687	1.256	4	1.74	-0.2	0.65	-5
Average before	2,391.11	10.06857706	0.3604	2.5454	-0.1104	1.62	-0.678	14.54	-0.408	-3.4
Average after	1,019.48	3.189991645	-0.0016	2.1492	0.138	1.92	-1.848	-0.12	0.238	0

Table 4. Turin 2006

Most of the host countries saw a temporary increase in GDP per capita, exports, labor force participation rate, during the year of the Olympics; some countries like Greece (Table 3) and Italy (Table 4) had averages that were in the positives and increasing both prior to and after the Olympics. 3 years before Italy's Olympics, GDP per capita started seeing big increases. Those increases also go for CPI, PPI, and interest rates. After having trouble finding the labor force participation rate for Greece in the time of these Olympics, I eventually found the activity rate for Greece on the FRED website. It shows the most growth that Greece had in that indicator was the year of the Olympics and the year before. Before and after that, there was little change. Italy saw a big jump in labor force participation 5 years prior, but the changes were much less significant after that. Both Italy and Greece are relatively small countries, so it gives us a picture of the impact compared to

larger countries. The only three countries that experienced a gain in profits from the Olympics were China, USA, and Russia.

BEIJING 2008 Years relative to the Olympics	% Change in		Labor Force Participation Rate	Registered Unemployment Rate	Exports: Value		PPI	Interest Rates	Consumer Confidence
	GDP per capita (in USD)	GDP per Capita			Goods (in Billion USD)	CPI			
-5	140.13	12.20102568	-0.009	4.1	9.005	1.85	2.4	6.6	13
-4	220.03	17.07459027	-0.01	0.2	8.895	2.7	1.1	0	11
-3	244.75	16.22289831	-0.005	-0.1	14.407	-2.04	2.3	0.63	-3
-2	345.81	19.72202895	-0.005	0	15.513	-0.13	-2.7	0	2
-1	594.74	28.33134054	0.01	-0.1	45.361	3.16	0.2	0	4
0	774.33	28.74308177	-0.015	-0.1	11.166	1.12	2.8	0.81	-4
1	363.94	10.49332526	-0.005	0.3	-30.863	-6.66	-14.3	-1.35	-10
2	718.21	18.74125838	0	-0.1	14.844	3.91	12.5	0	8
3	1067.68	23.46317397	-0.005	-0.1	39.637	2.37	2.3	0.46	-8
4	698.78	-34.551551	-0.0065	-4.1	4.158	-2.93	-5.9	0	4
5	733.74	5.00300524	-0.0035	0	22.192	0	-2.3	0	1
<b>Average Before</b>	237.68	16.3051358	-0.00725	1.05	11.955	0.595	0.775	1.8075	5.75
<b>Average After</b>	724.588	9.377857676	-0.0063	-0.82	7.7884	-0.438	-0.52	-0.016	-2

Table 5. Beijing 2008

While looking above at table 5, Beijing 2008; growth increased about a year before and during. Many indicators saw overall decreases. Not all of these decreases are negative, unemployment decreased in the 5 years after overall; as well as producer and consumer prices. Labor force participation rate saw negative decreases in both categories, the most drastic decrease was the year of the Olympics. Of the 9 Olympic games reviewed, 5 countries saw a decrease in labor force during the year of their respective games. GDP per capita was rising steadily, this is a change to the USA's GDP per capita in the years below; steady growth. While Russia struggled a little more to maintain a steady growth, this shows the per capita wealth that these bigger countries have over smaller ones. This may lessen the financial impact of the Olympics as well if the people have more money to contribute in taxes.

VANCOUVER 2010 Years Relative to Olympics	GDP per capita (in USD)	% Change in GDP per Capita	Labor force participation rate	Exports of Goods and Services (in Billion Canadian Dollar)	CPI	PPI	Home Ownership Rate	Interest Rates	Consumer Confidence
-5	4,238.83	13.18713352	-0.005	7.458	0.356		3.2	0.2	0
-4	-117.28	11.32838279	0.0075	6.429	0.0075		2.13	1.3	1
-3	34.28	10.26028008	-0.0055	6.793	-0.0055		2.46	-1.4	0.75
-2	-2,105.17	4.591726491	0.001	-1.763	0.001		0.32	1.6	-0.25
-1	-7,884.90	-12.49019761	-0.002	-21.643	-0.002		0.75	-1.4	-3
0	12,520.01	16.35609966	-0.0035	3.265	-0.0035		0.21	-0.8	-0.75
1	-2,024.15	9.801127285	0	12.13	0		7.78	2	0.75
2	-4216.23	0.852850334	-0.0045	10.1	-0.0045		0	-0.2	0
3	-479.38	-0.064535005	0.002	1.276	0.002		0.44	-1.3	0
4	-1,645.12	-3.190095583	-0.003	11.216	-0.0025		2.343	2.2	0.5
5	-5,680.74	-14.44354236	-0.0065	1.993	-0.005		-2.134	-1.3	0
Average before	512.665	9.84188072	-0.0005	4.72925	0.08975		2.0275	0.425	0.375
Average After	831.03	4.751089338	-0.0018	7.5974	-0.0017		2.1546	0.38	0.1

Table 6. Vancouver 2010

Vancouver had an average decrease in GDP per capita 5 years prior to the Olympic games of \$-1,166.85 and an average decrease in GDP per capita 5 years after the games of \$-2,809. However, between 2009 and 2010, GDP per capita saw a rise of \$12,520. Indicating a temporary increase in the year leading up to the Olympics. Labor Force Participation saw decreases in 7 of the years reviewed, and had overall negative averages. This contradicts some other countries experiencing increases, but it goes to show the impact can vary greatly. Exports saw a massive drop off the year before the Olympics, but after that saw gradual growth. As illustrated in one of the graphs, British Columbia (and Canada as a whole) saw a big drop in interest rates in the year of the Olympics. This was also only two years after the 2008 recession, but one could imagine the Olympics played some role in this. Consumers experienced an overall decrease in prices, while Producers saw overall increases. So the Consumers experienced a benefit while Producers experienced a cost. Home Ownership saw positive averages for both categories, but 6 of the 11 reviewed years saw a decrease in home ownership. Lastly, Consumer Confidence saw massive spikes, and drops. The year prior to the Olympics saw a drop off of 65 points, only to be picked back up again with an increase of 60 points in the year of the Olympics.

LONDON 2012 Years relative to the Olympics	GDP per capita (in USD)	Change in GDP per Capita	Labor force participation rate	Exports: Goods & Services (in Billion British Pound)	CPI	PPI	Home Ownership Rate	Interest Rates	Consumer Confidence
-5	5,972.36	13.4293116	-0.002	-12.567	-0.07	1.03	0.003	0.79	0.1
-4	-3,177.92	-6.299780771	0.0028	8.166	1.13	14.19	-0.008	-0.38	-1
-3	-8,530.11	-18.04664606	-0.0018	-0.94	-1.56	-6.31	-0.026	-0.82	-5.5
-2	799.87	2.064878707	-0.002	5.675	0.53	2.1	0.001	0.35	6.75
-1	2,510.84	6.350645235	0.001	17.234	1.37	2.5	-0.021	-0.29	-4.25
0	401.51	0.95489375	0.005	6.406	-1.29	8.2	-0.012	-1.62	-1.5
1	952.19	2.243132484	0.004	1.539	-0.28	1.1	-0.021	-0.33	1.25
2	4,050.89	9.333566199	0.0025	-3.389	-0.84	0.4	-0.002	1.13	3
3	-2,412.96	-5.085032938	0.0025	0.047	-1.08	-3.8	-0.009	-1.32	1.85
4	-3,990.89	-8.860917724	0.004	4.17	0.64	-1.2	-0.001	0.19	1.15
5	-743.63	-1.81159535	0.002	21.544	1.55	4	0.016	-0.36	-1.75
Average before	-484.99	-0.5003182578	-0.0004	3.5136	0.28	2.702	-0.0102	-0.07	-0.78
Average after	-428.88	-0.8361694658	0.003	4.7822	-0.002	0.1	-0.0034	-0.138	1.1

Table 7. London 2012

Other countries like the UK (Table 7) and Brazil (Table 9), saw decreases both before and after the Olympics. UK's decrease before was -\$484.99 and after was -\$428.88. Brazil's decrease before was -\$494.45, and after was -\$478.31. Both of the countries have similar numbers, which may suggest that the numbers were trending downwards. The labor force participation rate saw a steady increase, starting a year before their Olympics. The Olympic Games definitely create jobs, so the games must have factored in. Exports saw a 17 point increase the year before, with another 6 point increase in 2012. It dropped off for a few years after. CPI almost contrasts PPI in this case, there are certain years where CPI decreases and PPI increases, and vice versa. CPI saw a negative average in the 5 years after, which is beneficial. PPI saw average increases both before and after. Home ownership gradually decreased in the years reviewed, this is most likely due to a multitude of reasons but shows more than one country saw a decrease in home ownership during the years of the games. Interest rates had negative averages both before and after, and most years saw a substantial decrease. Consumer confidence remained fairly stagnant, but dropped 4.25 points in 2011 and another 1.5 points in 2012.

SOCHI 2014 Years Relative to the Olympics	GDP per capita		Labor force participation rate	Exports: Value Goods (in Billion USD)			Home Ownership Rate	Interest Rates	Consumer Confidence
	(in USD)	% Change in GDP per Capita		CPI	PPI				
-5	-3,072.47	-26.40652086	0.07	-17.058	6.97	-0.15	2.14	3	-35
-4	2,112.19	24.66704816	0	10.037	4.75	5.02	1.64	-4.25	15
-3	3,636.09	34.06176493	-0.007	3.303	6.12	10.43	0.9	-1	10
-2	1,109.79	7.754760647	0.01	9.713	2.91	4.47	0.6	0.25	5
-1	553.77	3.591042529	0.015	-1.635	5.17	3.31	1.1	0.25	-2
0	-1,878.99	-11.76233079	-0.015	0.556	4.72	1.07	-1.9	-0.25	-3
	0	0.00	0	0	0	0	0	0	0
1	-4,782.64	-33.92990036	0	-12.467	12.41	10.58	4.4	7	-20
2	-608.12	-6.529790046	0.01	-12.541	9.29	8.12	0.2	-4	3
3	2,015.44	23.15296345	-0.07	8.258	5.27	10.77	1.3	-1.25	7
4	567.03	5.28910957	0.006	7.966	2.42	3.03	0.4	-1.77	3
5	210.29	1.863237929	-0.006	-3.537	5.61	9.83	0.6	0	7
Average after	-519.60	-2.030875891	-0.012	-2.4642	7	8.466	1.38	-0.005	0
Average before	867.87	8.733619081	0.0176	0.872	5.184	4.616	1.276	-0.35	-1.4

Table 8. Sochi 2014

In Table 8 for Sochi 2014, there was an average increase in GDP per capita of \$867.87 5 years prior, and a decrease of -\$519.60 5 years after. Labor force participation rate remained fairly stagnant, but saw an average decrease 5 years prior. Exports dropped 12 points in 2015 and 2016, the two years following the Olympic games. CPI and PPI both averaged an increase before and after, substantial increases at that. The games ran a cost of approximately \$50 Billion, so there is no wonder prices saw such an increase. Home ownership averaged increases before and after, which is a rare occurrence of the 9 games reviewed. Interest rates averaged minimal decreases, it was raised 4.4% the year after the Olympics in 2015. Consumer confidence dropped in the 5 years prior, but there was also a 20 point drop off the year after the Olympics. This shows a trend in consumer confidence decreasing in the years relative to the Olympics when one may think it would increase.

RIO 2016 Years Relative to the Olympics	GDP per capita		Unemployment Rate	Exports of goods and services (% of GDP)			Housing	Interest Rates	Inflation rate	Consumer Confidence
	(in USD)	% Change in GDP per Capita		CPI	PPI					
-5	1959.3694	17.36068841	-1.225	0.717	-4.7171	50	20.127	2.3358	1.596	0
-4	-875.5883	-6.610402493	-0.5618	0.295	-4.49	30	15.9303	-0.2435	-1.2325	0
-3	-69.69932	-0.563453372	-0.0768	-0.136	-4.56	0	12.4474	-3.7241	0.8008	-5
-2	-187.73667	-1.526274128	-0.6639	-0.73	-5.125	100	11.9049	3.2461	0.1257	0
-1	-3298.587223	-27.2327199	0.5261	1.888	-3.57	-520	4.5393	1.7465	2.7	-7
0	-103.904297	-1.178855067	2.5374	-0.433	10.71	10	-3.6828	2.4698	-0.29	2
1	1,215.290	13.95265278	0	0.052	-5.36	0	-3.9683	-1.0366	-5.2937	2
2	-924.151989	-9.31099271	0	2.116	-7.855	10	0.3148	-6.6484	0.2185	-2
3	-103.75	-1.152580588	0	0	-6.93347	0	1.8253	-0.53	0.0672	9.8
4	-2,100.64	-23.60939722	0	0	-6.51923	23	8.6746	-2.12	-0.52023	-2.5
Average before	206.5862775	2.165139604	-0.631875	0.0365	-4.723025	45	15.1024	0.403575	0.3225	-1.25
Average after	20.87169575	0.5775561038		0.43375	-2.3596175	5	-1.37775	-1.4363	-1.3245	2.95

Table 9. Rio 2016

When looking at Rio 2016 (Table 9), GDP per capita had an average increase before and after the Olympics; but Brazil saw a drop of about \$3,299 in 2015. This is a fairly substantial hit. There was no data on the Unemployment rate following 2016, but it averaged a decrease 5 years prior. Although it averaged a decrease, the Unemployment Rate jumped 2.5% in 2016. The data cuts off after that. Exports remained stagnant, and also proved difficult to find the data for all of the years that were being reviewed. Consumer prices jumped 10 points in 2016, despite having negative averages. Producer prices averaged an increase of 45 points 5 years prior, which is very high. The massive price drop in 2015 may be attributed to oil prices of the country, but coupled with the Olympic games, it remained fairly low after. Housing seemed to be on the steady increase but saw a negative decrease of 1.37 points per year following. Interest rates jumped 2.5% in 2016, but dropped 6.6% two years after, in 2018. All of the data could not be found for consumer confidence, but you can see it increasing 2 points in 2016 and 2 points in 2017.

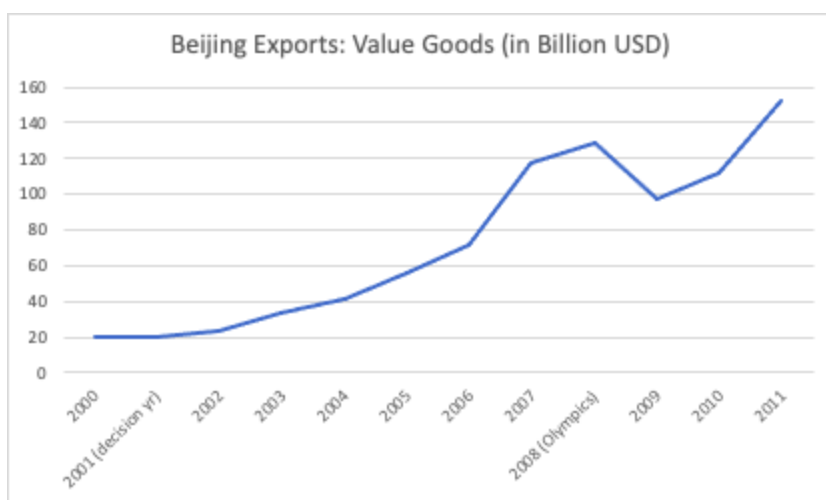


Figure 1. China Exports 2000-2011, billion USD.

With the data collection, I also created a series of graphs to illustrate some indicators. When looking at the figures below, some show an apparent change in the years around the Olympics. Of the countries reviewed, exports showed many changes, more-so than other indicators. As you can see in Figure 1, China was

experiencing a relatively constant growth in exports. From 2006-2008 you can see a sharp incline, with a sharp drop off after 2008.

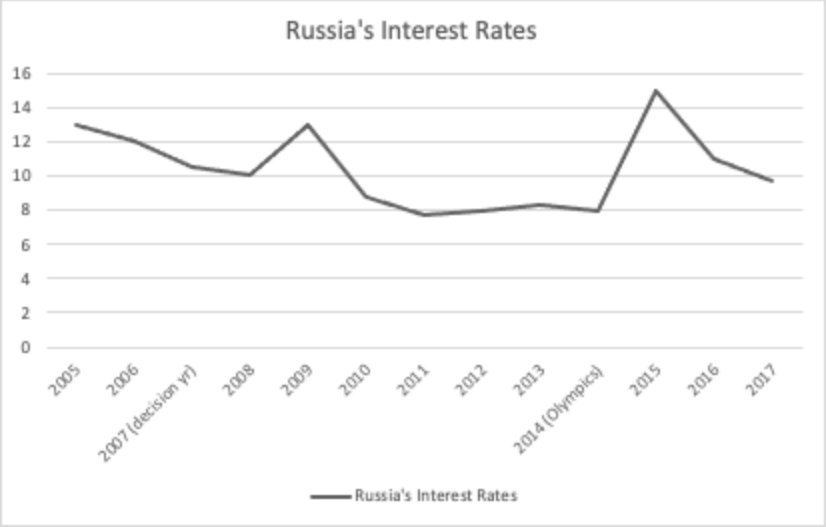


Figure 2 Russia's Interest Rates

When looking at Russia's interest rates in Figure 2, you can see a very sharp increase in the year of their Olympics. Countered with Canada's Interest Rates sharply decreasing to 0.25% the year of their Olympics (Figure 3). Russia saw a significant rise in inflation, so they raised interest rates to combat it. The Olympics surely did not help in terms of increased spending, especially when the price tag was about \$50 Billion, so this may have had a direct impact.

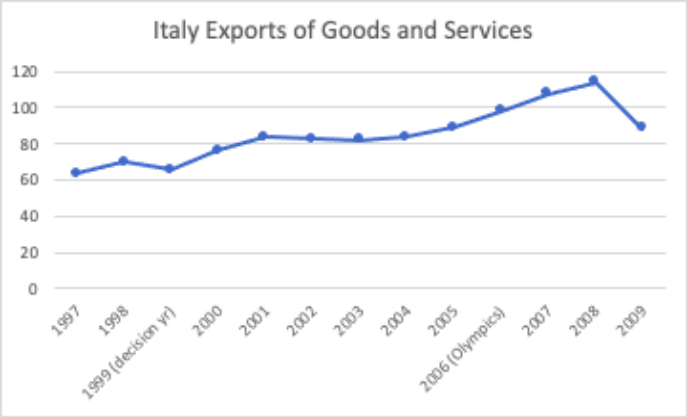


Figure 3 Italy's Exports of Goods and Services

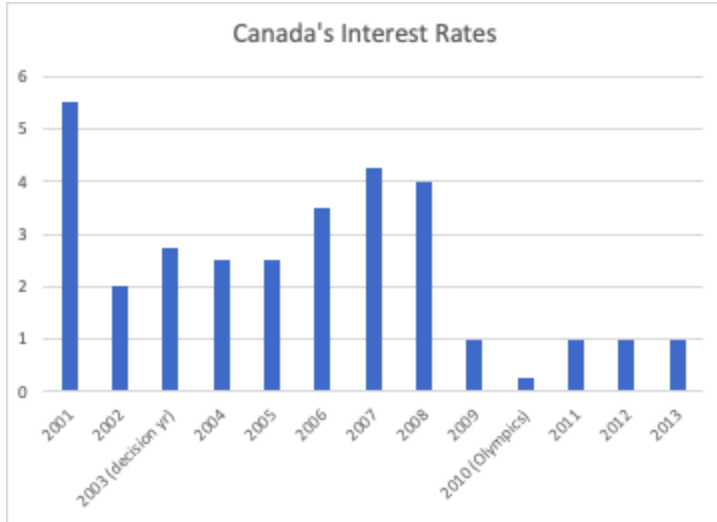


Figure 4 Canada's Interest Rates

This can also be related to the recession that occurred in 2008. In figure 6, you can see Italy's Exports plateaued until two years prior to the Olympics. From 2004 - 2008, Italy experienced a growth in Exports before a slight crash after 2008; and the Olympics must have had something to do with this.



Figure 5 Brazil's GDP per capita



Figure 6 Brazil's PPI

Russia's Interest Rates are not the only diagram to show a negative impact on the economy, Brazil's GDP per Capita (figure 4) dropped by almost \$4,000 dollars from 2014 to 2016. Other Countries saw effects in their GDP per capita during the Olympics, that may have been the most widely affected indicator.

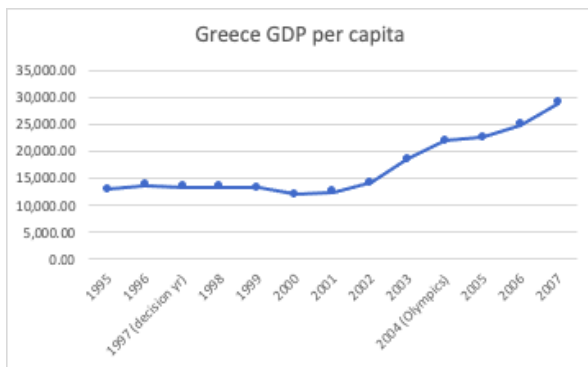


Figure 7 Greece's GDP per capita

Greece's GDP per capita was relatively stagnant from '95-'02. In the close years following Greece saw an increase of approximately \$10,000 from '02 - '04. 2004 was the year of their Olympics. London, Vancouver, Beijing, Turin, Athens, Salt Lake, and Sydney all saw an increase in GDP per capita in the year of the Olympics. Some of these countries also experienced that increase about a year or two before the Olympics, and a year or so after. While the inhabitants may have experienced an increase in wealth, it was only temporary. The per capita wealth eventually decreases in most of these Countries. While this happened, producers in Brazil saw a sharp drop in prices the year before the Olympics in 2015. There was

a massive drop in Oil prices that may prove to be causal to this, but the PPI remained low for years after.

## Cost/Benefit Analysis

<ul style="list-style-type: none"> <li>● Average GDP per capita increase 5 years <u>before</u>: \$603.50</li> <li>● Average GDP per capita increase 5 years <u>after</u>: \$1,077.25</li> <li>● Unemployment Rate 5 years <u>before</u>: -0.012</li> <li>● Exports <u>before</u>: +7.814</li> <li>● Exports <u>after</u>: +16.226</li> <li>● Housing Index <u>before</u>: +2.819</li> <li>● Housing Index <u>after</u>: +0.079</li> <li>● Interest Rates <u>after</u>: -0.04</li> <li>● Consumer Confidence <u>before</u>: +4.15</li> <li>● Consumer Confidence <u>after</u>: +0.428</li> <li>● Sochi 2014 Profit: \$53 Million               <ul style="list-style-type: none"> <li>○ Total Cost: \$50 Billion</li> </ul> </li> <li>● Beijing 2008 Profit: \$146 Million               <ul style="list-style-type: none"> <li>○ Total cost: \$42 Billion</li> </ul> </li> <li>● Salt Lake 2002 Profit: \$101 Million               <ul style="list-style-type: none"> <li>○ Total Cost: \$1.9 Billion</li> </ul> </li> </ul> <p><b>Total: 13</b></p>	<ul style="list-style-type: none"> <li>● Unemployment Rate 5 years <u>after</u>: +0.04</li> <li>● CPI <u>before</u>: +0.915</li> <li>● CPI <u>after</u>: +1.071</li> <li>● PPI <u>before</u>: +7.096</li> <li>● PPI <u>after</u>: +2.43</li> <li>● Interest Rates <u>before</u>: + 0.081</li> <li>● Rio 2016 Loss: \$2 Billion               <ul style="list-style-type: none"> <li>○ Taxpayer contribution: \$11.6 Billion</li> <li>○ Total Cost: Over \$20 Billion</li> </ul> </li> <li>● London 2012 Loss: \$4.6 Billion               <ul style="list-style-type: none"> <li>○ Taxpayer contribution: \$4.4 Billion</li> <li>○ Total Cost: \$14.6 Billion</li> </ul> </li> <li>● Turin 2006 Loss: \$3.2 Million               <ul style="list-style-type: none"> <li>○ Total Cost: \$2.5 Billion</li> </ul> </li> <li>● Athens 2004 Loss: \$14.5 Million               <ul style="list-style-type: none"> <li>○ Taxpayer contribution: \$6.2 Billion</li> <li>○ Total Cost: \$3 Billion</li> </ul> </li> <li>● Sydney 2000 Loss: \$2.1 Billion               <ul style="list-style-type: none"> <li>○ Taxpayer contribution: \$11.4 Million</li> <li>○ Total Cost: \$6.5 Billion</li> </ul> </li> <li>● Vancouver 2010 Profit/Loss: Break even               <ul style="list-style-type: none"> <li>○ Taxpayer contribution: \$925 Million</li> </ul> </li> </ul> <p><b>Total: 12 (w/ taxpayer: 17)</b></p>
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When looking at all of the averages of the 9 Countries before and after, along with the Countries profit/loss (& taxpayer contributions for some), I composed a cost/benefit analysis chart. As you can see, there are 13 recorded benefits; some examples include: GDP per capita averaged an increase of \$603.50 in the 5 years

before and \$1,077.25 after. Other benefits include Unemployment averaging a decline 5 years before, Exports both before and after, Housing, Consumer Confidence, and others all saw increases in the right direction. Losses are substantial as well, with Countries like Brazil, UK, Italy, and Athens experiencing a loss in revenue; along with the taxpayer contribution being in the billions of dollars for some of these countries. Brazil has experienced problems trying to find uses in stadiums that were built for the Olympics today, and taxpayers contributed \$11.6 Billion for the costs when that money could have gone toward much needed infrastructure. The only countries that saw a gain were the 3 economic powerhouses of the world: the US, China, and Russia. These countries most likely have to worry about costs less, and income among the people of these countries may allow more people to tune in or attend these games. But the cost has also risen exponentially in recent years, as Salt Lake 2002 and Sochi 2014 were both Winter Olympics, and the total cost for the US was \$1.9 Billion and Sochi 2014 was approximately \$50 Billion.

## Limitations

Some limitations to the data may have affected the impact that we see. For example, the 2008 crisis affected the whole world. Of the games reviewed, most of them had 2008 data somewhere in the years relative to the Olympics. There would clearly be a negative effect because the crisis affected many economic indicators. The extremely low interest rate in Canada in 2010 may have also been residual from the recession. There may have also been countrywide events that could affect these indicators, as opposed to worldwide. Brazil saw a sharp decline in oil prices in 2015, so that may have impacted the PPI chart that you see. That coupled with the Olympics a year later may have led to the mass drop off. Russia experienced extremely high inflation in 2016, so the interest rates rose significantly. The massive bill of \$50 Billion in Sochi 2014 may have had a direct impact on increased price levels.

## Conclusion

While there is no significant evidence to conclude the overall impact of the Olympics on a country, there is more data and evidence to add to the ongoing conversation. There has been a drop off in countries who throw their hat into the bidding pool for future Olympics, and the mal-investment and sunk costs that a country may experience is seeming decreasingly worth it. We have found several countries which experienced a loss from the games, all while having taxpayer contributions in the Billions in some cases. Greece is still currently paying off their Olympics, taxpayers have to foot a bill of \$56,635 annually until their debt is paid. This can all point to a negative impact, but it of course is not all negative. Average GDP per capita, housing indexes, consumer confidence and exports all increased in the years of the Olympics. Exports saw increases in almost every country, and the average after the Olympics was an increase of 16 points in exports.

Of the years reviewed, the larger countries seemed to sustain a lighter loss than others. That may be because the population is just too large for the indicators to show the real impact. Finding uses for these facilities in the years after the Olympics always proves to be difficult and can prove to be a negative externality. Italy found a good use in recent years, the country used old athletic compounds from Turin 2006 to house African refugees (Davis, 2018.). So as most things it is not just black and white. Baade & Matheson (2016) pointed out that the economic impact of the Olympics may be of secondary concern to the authors. The ego's of the leaders/government within a country may be the main driving factor. If a country is big or rich enough, the impact may not be as severely felt throughout the country; while smaller countries may experience debts and costs that can take years to recover from. All while harming the people within the country, while the games are very entertaining, is it worth possibly going bankrupt as a country? The answer may vary greatly. Countries that are still developing must closely analyze whether having these games will be beneficial or detrimental.

As stated in the previous paragraph, all of the countries that experienced a gain are bigger, so they may have stadiums that are already built to use. While smaller countries have to build, Rio built many stadiums. Greece had to build more and is still paying off the debt of the Olympics. The countries that experienced a gain were the three main economic powerhouses of the world; the US, China, and Russia. There is a higher likelihood of these countries having more stadiums to use from the sheer size of the countries. There is also much more money within these countries, so it makes fronting the costs that much easier.

There are potential solutions. It may be much more beneficial for European countries to adopt a method used for the Euro Champ in soccer - have multiple host countries. Having stadiums that are located throughout Western Europe be used for the games. Many stadiums are big enough to fit the occupants and are already built. You could do this for all of the seven continents. It may help split up and reduce the costs for each country. We can look at it through the single entity model that certain sports leagues adopt. Through this model, there are no franchises, investors just purchase shares of the league to finance each team. We can look at individual host cities as a franchise when they host an Olympics. By having the entire country contribute capital and infrastructure, it is almost like having investors purchasing shares of a league in the single-entity model. This allows costs to be dispersed and may actually bring in more revenue. Having a central Olympic location could also work but may not be as widely accepted because it is not a changing location. People may enjoy that aspect of the games.

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