To Host or Not to Host? A Comparison Study of the Long-Run Impacts of the Olympic Games

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Abstract

I explore the long-run economic impact that the Olympic Games have on host countries by comparing them to couuntries who bid to host but were not awarded the Games and were therefore the first runner-up. My analysis aims to provide further insight into the general economic effects of hosting a sports mega-event and test prevailing hypotheses that countries experience a negative economic impact from hosting. I extend the current research by exploring what happens at an aggregate level across all countries over a longer period of time, i.e. during the ten years after the Games are hosted. Upon including control variables for the state of the economy, fluctuations in population and omitting an anomalous pair of countries, I find that the long-run impact on GDP per capita of host countries is negative. This suggests that a one-time spike in government expenditure in order to host the Olympics may result in a long-run detrimental effect, as investment demand and consumption force output back to pre-Olympic normal levels. These observations support qualitative evidence in recent literature about the impact of the Games on individual host countries.

1 Introduction

When the first Olympic Games were hosted in Olympia, Greece in 776 BC, perhaps few knew that they would go on to become one of the most widely watched mega-events in the world. The Games quickly developed into a political tool, used by one city-state to assert dominance over another. Today, the Games continue to present more than the prowess of the world's top athletes; they have largely morphed into a display of the host country's economic capability to host an international mega-event.

In this paper, I attempt to determine what long-run economic impact the Olympics have had on host countries in general. "Long-run," in this context is defined as the ten years after the Games are held. Little research has been done in this area: most focuses on the immediate or short-run effects of one or two countries at a time (Hotckiss et al, 2003; Madden and Giesecke, 2007; Matheson, 2006; Veraros et al, 2004). Since there is little quantitative evidence about the benefits of hosting the Games in general, it is difficult to determine whether countries are justified in spending so much money on bidding for, and hosting, them (Brunet, 1995; Owen, 2005; Whitson and Horne, 2006). My study extends the current research by analyzing the long-run effects on countries' gross domestic product per capita. If there is a positive economic effect on host countries, then my results support the existing literature that claims the Olympics are beneficial to the host countries' economies (Hotchkiss et al, 2003; Veraros et al, 2004) and can allow us to conclude that there is substantial economic justification of hosting the Games. If, however, there is a negative economic impact on host countries, then my results support the ex ante analysis that there is a negative effect per country (Jones, 2001; Matheson, 2006, PricewaterhouseCoopers, 2005) and can opn the door to questions about *why* countries bid to host the Games in the first place.

In an effort to assess the economic benefits of hosting the Olympics, I compare host and "runner-up" countries' GDP per capita from 1970 to 1998. The "runner-up countries" are those countries that bid to host the Olympics but were ultimately not awarded them and were second only to the host countries. By considering the year that the country hosted the Olympics as "year 0," I collect GDPpc per year for the ten years before the Games were hosted and the ten years after. I then average across all countries per year, and normalize these averages to the seven years before they were held, i.e. the year that the host country is announced (Olympic.org). I repeat this process for the runner-up countries and, upon graphing notice a comparatively negative impact on the average, normalized GDPpc for host countries beginning two years before the Games are held. I test to see if this gap is statistically significant and conclude that there is a negative impact on GDPpc for host countries. My results suggest that the ex post analysis of the negative short-run impacts on an individual host country can be extended to long-run impacts on the group of host countries as well.

2 Literature Review

When the Olympic flame is lit every two years, the surge in patriotism and excitement across the world is nearly tangible. For almost a decade before the Games are held, and then for a vivid two weeks after the Opening Ceremony, a spotlight is focused on the host country. This paper aims to quantify the long-run economic impact of the Olympics on host countries in general. I do this by determining whether there is a significant impact on the group of host countries' average yearly GDP per capita during the ten years after the Games by comparing it with the group of runner-up countries.

Some researchers argue that increased international awareness about the host country leads to an increase in foreign direct investment (Veraros et al, 2004), employment levels (Hotchkiss et al, 2003), and overall net exports (Rose and Spiegel, 2010). This can ultimately contribute to a positive impact on the hosts' output. A study on the economic impact of the 1996 Atlanta Games on employment levels in Georgia use standard and modified differences-in-differences techniques to determine whether employment levels in regions near Atlanta changed. They concluded that the Games boosted employment by 17% in counties "affiliated with and close to Olympic activity," relative to employment increases in other counties. The results withstood several robustness checks, like a random-growth model test across multiple metropolitan statistical areas. The researchers saw an 11% additional increase in employment post-Olympics versus pre-Olympics in comparison to other, similar metropolitan statistical areas (Hotchkiss et all, 2003). Other researchers studied the effects of the Olympic host announcement in 2004 on the stock prices of the country chosen to host the Games (in this case, Greece) in comparison to those of the runner-up bidder (in this case, Italy). Their analysis revealed that there was a statistically significant, positive effect on the Athens Stock Exchange, and little impact on the Milan Stock Exchange (Veraros et al, 2004).

On the other hand, a large realm of literature indicates that the Olympics result in a negative economic impact on the host country's output. Researchers point to bias in pre-Game estimates of the economic impact (Jones, 2001), the transient nature of employment in the construction and tourism sectors (Smith, 2009; Seasonworkers.com), and the fact that, often, Olympic housing and stadiums go unused (Owen, 2005) resulting in sunk costs. An increase in enthusiasm for hosting mega-events is due to the expectation of increased revenue. For instance, though the 1988 Canada Games in Calgary were considered successful

because of a recorded profit of more than $130 million, "the few scholarly studies that have examined the economic impacts... suggest that the direct impacts... [were] not as a great as official rhetoric implies (Whitson and Horne, 2006)." Often, economic benefits are "overstated" in order to rationalize the project. In an examination of the regional economic effects of hosting the Rugby World Cup, researchers concluded that the commonly-used input-output (IO) tables[1] used to estimate the impact before mega-events are hosted can "over-represent the [tourism] activity resulting from special events," even if they provide a reasonable estimate for day-to-day activities (Jones, 2001). More recent research attempts to explain why ex ante estimates of the economic impact of large sporting events tends to "exaggerate the net economic benefits (Matheson, 2006)." In studying the results of several post-Game studies, researchers note that ex ante analysis is often biased by committees that need an infusion of tax-payers' money. Even without bias, ex ante studies suffer from three primary theoretical deficiencies: "the substitution effect, crowding out and leakages." First, a substitution effect occurs when local consumers spend money on a sporting event; the result is "not new economic activity [but] rather a reshuffling of local spending." Spending by local residents, therefore, must be excluded from economic impact estimates. Second, the crowding out phenomena can occur when an influx of tourists simply "supplant rather than supplement the regular tourist economy." This is especially important since host cities tend to be popular tourist destinations. Finally, leakages occur if tourists' spending does not necessarily "wind up in the pockets of local residents... [even though t]he taxes used to subsidize these events... are paid for by local taxpayers." Finally, the complex IO tables that are used for pre-Game analysis are rooted in inter-industry relationships

[1] Input-output tables attempt to model the dynamic time path of the economy which may be in a state of disequilibrium as it "tracks towards continually shifting equilibria" in order to present a realistic picture of the impacts of dynamic characteristics of "economic structure and change (West and Jackson, 1998)."

that are based on an economic area's "normal production patterns." However, these "normal" patterns do not necessarily hold during a sporting mega-event.

Only a small portion of the existing literature on sporting mega-events discusses the long-run negative impact on host countries (PricewaterhouseCoopers, 2004; Madden and Giesecke, 2007). In an analysis on Spain and Australia in the five to seven years after the Games, researchers saw a sharp slowdown in investment expenditure (PricewaterhouseCoopers, 2004). They claim that "further ex-post econometric studies (Madden and Giesecke, 2007)" are needed in order to analyze in-depth the long-run economic effect of hosting the Games. In an effort to shed some light on this debate, I use a simple OLS regression to test the long-run impact on host countries in general. I conclude that, consistent with the majority of the literature, the gap between host and runner-up countries is negative.

In addition, much of the existing literature focuses on individual host countries (Brunet, 2005; Shoval, 2002). Little research has been done on whether the Olympics have, *in general*, had a positive or negative impact on host countries. A 2010 study stands out, however: in its analysis on the countries that bid to host the Games compared to all other countries (including non-bidders), researchers revealed that an "Olympic effect" exists on bidding countries' net exports. They conclude that the impact on net exports for any country that bid to host the Games was positive (Rose and Spiegel, 2010). Historical data indicates that bidding for the Games coincided with international integration into world markets and could be considered equivalent to signaling the country's desire to be more "open:"

> Our explanation seems to accord well with the facts, at least superficially. In July 2001, Beijing was awarded the right to host

> the Games of the XXIX Olympiad. Just two months later, China successfully concluded negotiations with the World Trade Organization, thus formalizing its commitment to trade liberalization. Nor is this a one-off coincidence. Rome was awarded the 1960 Games in 1955, the same year Italy started to move towards currency convertibility, joined the UN, and, most importantly, began the Messina negotiations that led two years later to the Treaty of Rome and the creation of the European Economic Community. The Tokyo Games of 1964 coincided with Japanese entry into the IMF and the OECD. Barcelona was awarded the 1992 Games in 1986, the same year Spain joined the EEC; the decision to award Korea the 1988 Games coincided with Korea's political liberalization. [Furthermore, this] correlation extends beyond the Olympics; the 1986 World Cup was held in Mexico coincident with its trade liberalization and entry into the General Agreement on Tariffs and Trade, the predecessor to the World Trade Organization.

Though countries continue to invest millions of dollars in hosting the Olympics and in bidding to host the Games, there is little research focused on whether such investments are justified. I try to answer this question by doing a comparison study on the long-run effect of the Olympics on GDP per capita. I define the "hosts" to be my treatment group, and the "runners-up" as my naturally-formed control group. I am implicitly assuming, therefore, that the group of runner-up countries are the same as host countries (in terms of, for example, being able to finance the Olympics if chosen to host them) except that they were not awarded the right to host the Games. My research attempts to fill the gap in

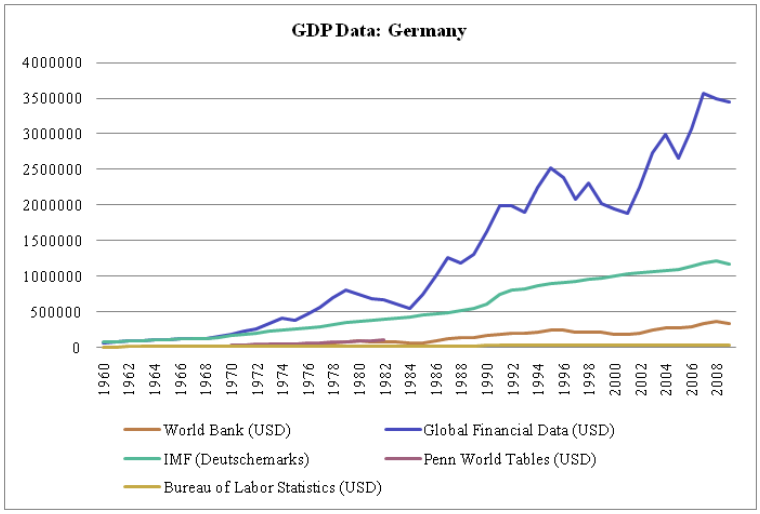
the existing literature by analyzing the economic impact on the entire group of host countries. I find, on average, host countries experience a negative impact on GDP per capita levels beginning around three years before the Games are hosted and for the following years (i.e. until year +10).

3 Data

3.1 General Information

In order to determine whether there is an impact on host countries' GDP per capita levels, I analyze data from the World Bank Databank. My data set contained the countries listed as a bidder or host of the Olympics from 1933 to 2010 (IOC Voting Results); however, the summer 1984 Los Angeles Games had no runner-up country and thus the number of hosts was slightly greater than the number of runner-up countries. I chose to use the World Bank because alternative databases had fewer countries' data available. A viable alternative, Global Financial Data (GFD), provided GDP levels for nearly all countries beginning from 1950. However, in comparing data from GFD with data from other sources (Penn World Tables, International Monetary Fund, US Bureau of Labor Statistics), I noticed that some countries exhibited trends in GDP that were significantly different from other databanks' GDP data trends; other countries trends, however, were similar. Figure 1 provides an example of the large discrepancy in trends for German data. In part due to this inconsistency, I settled on using World Bank data. However, since this data was only available from 1960 to 2008, and I was interested in the GDPpc levels for the ten years before and after each Olympic Game, I was forced to narrow my list of countries to those that hosted on or after 1970 and before 1998. The 540 data observations I used are in current USD and adjusted for inflation.

Figure 1. Gross domestic product for Germany, 1960-2008



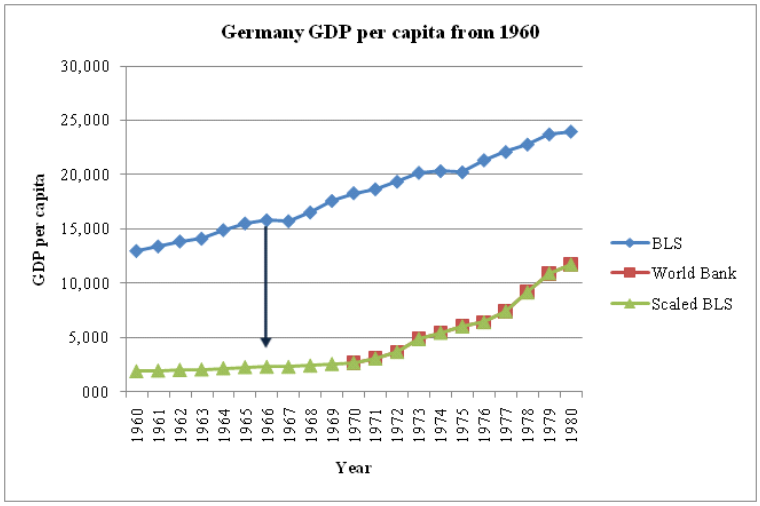
3.2 Constructing the Data Set

My data set was missing GDP per capita for three countries: Yugoslavia for the years before 1994 (Yugoslavia hosted the winter Olympics in 1984); Germany for the years before 1970 (Germany hosted the summer Olympics in 1972; and Russia for the years before 1998 (Russia hosted the summer Olympics in 1980 and was runner-up in 1976). Since my data set is relatively small, I believe it is important to briefly explain any decision to omit certain subsets.

3.2.1 Yugoslavia

Present-day Yugoslavia is comprised of Slovenia, Macedonia, Croatia, Serbia, Montenegro, Kosovo, Bosnia and Herzegovina. Extensive research revealed, however, that very little documentation of GDP per capita before 1994 exists for Kosovo and Montenegro. Furthermore, some provinces, like Kosovo, were a part of Serbia. Given the missing data and the accounting difficulties that would arise even if such data were found, it seemed more precise to drop Yugoslavia

Figure 2. Method for filling holes in Germany data



all together from my data set. Thus the number of host countries in my data set was now equal to the number of runner-up countries.

3.2.2 Germany

Any data included for Germany is of West Germany. This is because I was interested only in data for the years before 1970, and only West Germany's GDPpc levels were documented before the fall of the Berlin Wall in 1989. Since the 1972 Games were held in Munich (West Germany), and my analysis is on the years from 1962 to 1982, I was able to use this data to accurately assess the impact of the Games on West Germany. Inflation-adjusted, current USD GDPpc for Germany was available from the US Bureau of Labor Statistics (BLS). However, this data didn't align precisely with the World Bank Data, though it exhibited similar trends. In order to match the World Bank data, I scaled the BLS GDPpc from the first overlapping year (1970) so that it was equal to the World Bank GDPpc from 1970. I then applied this scaling factor

to previous years' worth of data from the BLS.

3.2.3 Russia

Obtaining data on Russia was the most difficult, ultimately proving to be too complex to accurately calculate and include in my analysis. In an effort to obtain data for Russia, separate from the USSR before 1988, I worked extensively with librarians Jim Church and Allan Urbanic and obtained several Russian Statistical Yearbooks from 1962 to 1981. Upon translating these books from Russian to English, we discovered that the data was categorized under very different labels compared to US economic measures: "manufacturing national income" and "national social product" referred to GDP and GNP respectively (Khomenko, 2006). Further, yearly data from 1960 through the 1980's were listed in terms of a baseline of 100 from the closest five year-mark before the year of interest (for example, 1967 data was listed with 1965=100, 1971 data was listed with 1970=100). The data was adjusted for inflation to the base year as well. Then in the 1990's, recorders switched to tabulating data in terms of billions of Russian rubles. I thus decided to exclude Russia from my data set; since Russia was a bidder for the Olympics in 1976 and then hosted the summer Games in 1980, the number of countries in my runner-up and host group remained the same.

A table of summary statistics of the data is presented here. The complete data set is included in the Appendix.

4 Methodology

I first graphed the average, normalized GDPpc for the ten years before and after the Games were hosted. I tabulated the data in two tables, one for host

Table 1. Summary statistics of panel data (number of observations = 540)

Country, Year	Number of Observations	Mean	Standard Deviation	Min	Max
Japan 1972	21	4058.935	3314.966	633.6403	10062.14
West Germany 1972	21	5200.999	3328.18	2035.105	11744.24
USA 1972	21	9557.146	4743.748	3972.123	18427.29
Canada 1976	21	8223.085	3898.543	3010.706	14076.75
USA 1980	21	12784.15	5837.602	4997.757	23053.96
USA 1984	21	16476.07	6318.374	6948.198	26719.14
Canada 1988	21	16523.84	4281.311	8931.293	21260.29
South Korea 1988	21	5349.766	3639.551	1382.921	12249.17
France 1992	21	19396.12	5785.909	9246.708	26421.36
Spain 1992	21	11622.21	4394.79	4354.135	16610.54
Norway 1992	21	31426.92	10410.69	14758.11	56311.5
USA 1996	21	29961.49	7815.266	18427.29	44663.47
Japan 1998	21	33042.25	4775.065	24145.25	41967.65
Canada 1972	21	6102.673	3360.628	2255.23	12217.37
Spain 1972	21	2453.041	1845.162	519.4755	6045.136
Switzerland 1976	21	10544.15	6108.153	2784.734	22150.27
Canada 1980	21	11192.54	4976.208	4047.269	20968.04
USA 1980	21	12784.15	5837.602	4997.757	23053.96
Japan 1984	21	16164.8	10600.36	4218.375	38243.87
Sweden 1988	21	21147.18	7329.043	11709.86	31262.71
Japan 1988	21	22035.65	11475.93	8547.392	41967.65
Bulgaria 1992	21	1818.279	552.5468	1063.944	3168.992
France 1992	21	19396.12	5785.909	9246.708	26421.36
Sweden 1994	21	26188.73	6729.439	12167.4	40268
Greece 1996	21	12432.7	4905.296	5445.024	23682.01
USA 1998	21	32628.83	8374.535	20698.24	47208.54

countries and one for runner-up countries, with each column representing a particular country and each row labeled -10, -9, ... 0, 1, 2, ... 10, where -10 corresponds to ten years before the Olympics were held in the host country, and +10 corresponds to ten years after. I then averaged the GDPpc for each year across all countries to obtain an "average host GDPpc" for years -10 to +10, and similarly for the runner-up countries. According to the official Olympics homepage (Olympic.org), the host country is announced seven years before the Games actually occur. To see if there was an impact on GDPpc around this time, I normalized each of the entries so that year -7 corresponded to a value of 1. To test whether the gap was statistically significant, I ran two regressions: first,

$$Averagenormalized GDPpc = \alpha + \beta_1 \times Host + \beta_2 \times Time + \beta_3 \times (Host \times Time) + \epsilon \textbf{(1)}$$

and then

$$GDPpc = \alpha + \beta_1 \times Host + \beta_2 \times Time + \beta_3 \times (Host \times Time) + \epsilon \textbf{(2)}$$

where

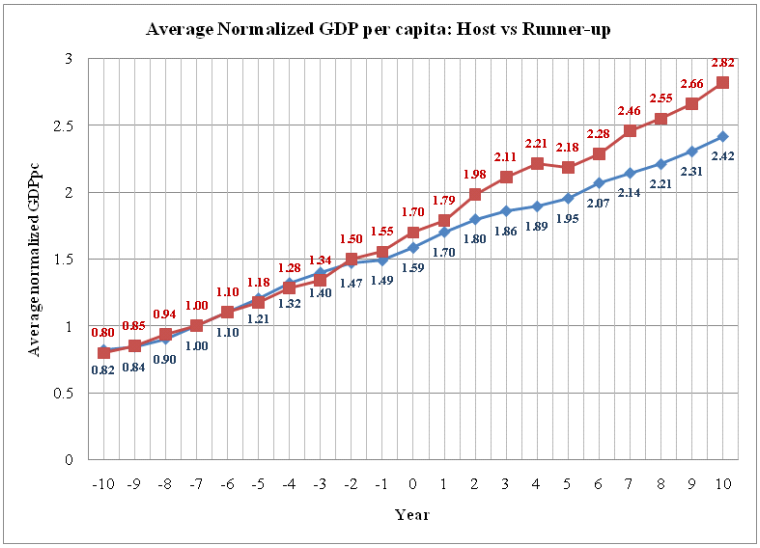
$Host = 1$if the country hosted the Olympics and 0 otherwise

$Time = 1$if the year is greater than or equal to -2 and 0 otherwise

Adding in $InitialGDPpc$ (i.e. the GDP per capita level at year -10) and $InitialPop$ (i.e. the total population at year -10) allowed me to control for the initial state of the economy and tourism effects, and resulted in a better fit, with the R^2 term jumping from 0.159 to 0.792. I concluded that the coefficient on the interaction variable was very negative, though not statistically significant. Finally, upon studying individual pairs of countries (graphs in Appendix) I noted a large gap between France who hosted the 1992 Olympics, and Bulgaria,

Figure 3. Graph of Average Normalized GDPpc

Blue = Host country, Red = Runner-up country



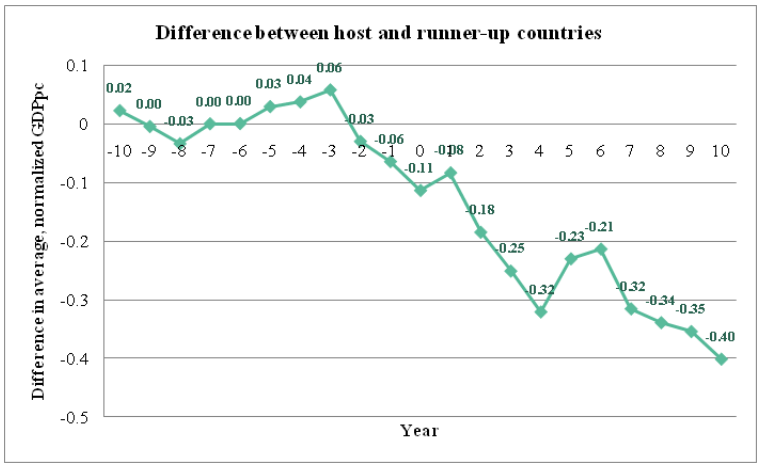
who was runner-up to France in 1992, with the host country experiencing a very large positive effect post-Olympics relative to Bulgaria. This, however, was in the opposite direction of the coefficient on my interaction variable, suggesting that the France/Bulgaria pair of 1992 may have been an anomaly from the pairs of countries that I was studying. In fact, removing this pair of countries resulted in the R^2 term increasing dramatically to 0.800 and the coefficient on the interaction dummy remaining negative but becoming statistically significant at the 95% level. Thus, I conclude that the effect of hosting the Olympics results in a negative long-run impact on GDP per capita for host countries in general.

5 Results

5.1 Evaluation of Findings

It appears that the long-run impact of hosting the Olympics is negative for host countries' GDP per capita in comparison to runner-up countries (Figure

Figure 4. Graph of difference in average, normalized GDPpc



3). From Table 2.ii there is an estimated negative impact of USD $1294.6; after adding in additional control variables, the standard error remains approximately USD $850. Interpreted in context of GDP per capita, we can conclude (though not confidently) that each person in a host country loses, on average anywhere between USD $439.7934 and USD $2149.4066.

Table 3 (next page) indicates, therefore, that an individual could lose, on average, 23.65 percent of their annual GDPpc as a result of the increased spending in order to host the Olympic Games.

Though negative, the coefficient on the interaction variable also has a large standard error. Thus, though we can conclude that there is a negative impact on host countries in general, it is difficult to know exactly how large this negative impact actually is.

The p-value in Table 2 (ii) is very close to the required 0.10 measure in order to be statistically significant at the 90% level (p-value = 0.130). This suggests that perhaps one pair of countries could be acting in the opposite direction (i.e. the host appears to be getting a large positive impact from the Olympics). To

Table 2. Regression (2) Results

Dependent variable: Real GDP per capita per country Olympic Games 1970-1988 Excluding Yugoslavia, Russia 1980, Russia 1976 (Number of observations = 540)		
Variable	Coefficient	P>|t|
Constant	11350.76***	0
	(786.9263)	
Host dummy	1219.18	0.274
	(1112.882)	
Time dummy	9556.811***	0
	(1274.966)	
Interaction dummy ($Host \times Time$)	-1436.722	0.426
	(1803.075)	
R^2	0.1522	
Adjusting Time (1 if year≥+2), Including independent variables: initial GDPpc, population		
Constant	515.0503**	0.295
	(491.411)	
Initial GDPpc	1.420097***	0.000
	(0.0363207)	
Initial Population	1.48E-06	0.562
	(2.54E-06)	
Host dummy	-379.661	0.526
	(558.0778)	
Time dummy	9553.716***	0.000
	(604.4395)	
Interaction dummy ($Host \times Time$)	-1294.6	0.130
	(854.8066)	
R^2	0.7974	

Table 3. Regression (1) Results

Dependent variable: Average, normalized GDPpc per country Olympic Games 1970 - 1988 Excluding Yugoslavia 1984, Russia 1976, Russia 1980 (Number of observations = 540)		
Variable	Coefficient	P>|t|
Constant	1.06066***	0.000
	(0.1126131)	
Host dummy	0.0136011	0.932
	(0.159259)	
Time dummy	1.077978***	0.000
	(0.1431288)	
Interaction dummy (host×time)	-0.2365452	0.250
	(0.2024147)	
R^2	0.7102	

test this theory, I graphed each pair of host and runner-up countries. I noticed a large gap between France and Bulgaria in 1992, with the difference between the host and runner-up countries' GDPpc becoming larger and more positive over time. In particular, France's GDPpc increases dramatically compared to Bulgaria five years before it hosts the Games. This appears to be in the opposite direction of the negative trend I noticed in Figure 3 and gathered from my regression results.

I then ran regression (2) again, omitting the 1992 pair. The first year that I obtained a statistically significant p-value was when the year of interest was three years before the Olympics were hosted. My regression now resulted in an increase in the R^2 term and a statistically significant p-value of 0.019. Thus, we can conclude with 95% confidence that the overall long-run impact on the GDP per capita of countries hosting the Olympics is negative, beginning three years before the Games are hosted. This matches with what I had observed in my initial graphical comparison of the groups of hosts and runner-up countries (Figure 3).

The negative impact on the two to three years before the Games are hosted

Figure 5. Graph of normalized GDPpc, 1992 Host/Runner-up Pair

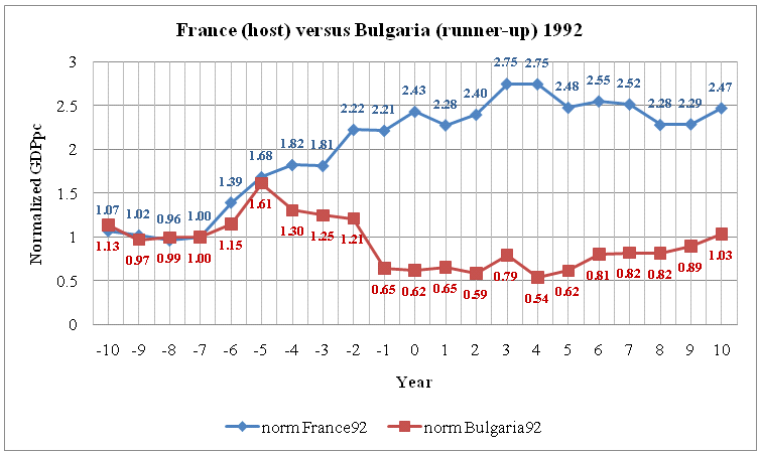


Table 4. Regression (2) Results without France/Bulgaria 1992, Time=1 if year≥-3

Dependent variable: Real GDP per capita per country Olympic Games 1970-1988 (Number of observations =498)		
Variable	Coefficient	P>|t|
Constant	18.97369**	0.030
	(599.1591)	
Initial GDPpc	1.387772***	0.000
	(0.037935)	
Initial Population	-1.19e-7	0.965
	(2.70e-6)	
Host Dummy	-246.5801	0.736
	(731.1249)	
Time Dummy	10453.4***	0.000
	(677.523)	
Interaction Dummy ($Host \times Time$)	-2221.625**	0.021
	(956.7949)	
R^2	0.8099	

seems realistic and normal: as host countries prepare stadiums and develop or restore transportation networks and sewage systems, there expenditures will increase. What is more interesting, however, is that there appears to be a negative impact on host countries for several years after the Games are held. As pointed out in the most current research on the long-run effects (PricewaterhouseCoopers, 2004; Madden and Giesecke, 2007), this negative impact on the host countries may be a result of the increase in domestic investment and excitement for hosting the Olympics. This, in turn, would lead to an increase in domestic and international demand for host country's products and would most likely be seen through the consumption channel of the classic macroeconomic equation for output:

$$Y = C(Y - T) + G + I(r) + NX(r)$$

However, this spike in consumption would be relatively short-lived and as public infrastructure built for the Games remains unused, negative capacity effects could result in a decline in long-run output. Thus though an increase in government spending is expansionary fiscal policy, the spending on the Olympic Games may have an even smaller multiplier effect than current research suggests (Ball, 1999). This may partially be attributed to the multiplier working the opposite direction: the non-recurring boost to expenditure results in a longer-run fall in demand as the economy returns to its pre-Olympic equilibrium income (PricewaterhouseCoopers, 2004). This suggests an explanation for why the impact is negative for a long period of time after the Games are hosted.

5.2 A Word about the 1992 Olympic Games

In order to determine whether France/Bulgaria was an anomalous pair, I analyzed historical evidence regarding France and Bulgaria from the 1990's I con-

clude that a possible explanation for why the impact on France was relatively large and positive was because this pair was the only post-Cold War pair that compared a non-Communist country (France) with a post-Communist regime (Bulgaria). Like other countries transitioning to capitalism, Bulgaria experienced a painful transition characterized by massive unemployment as uncompetitive industries failed and the backward state of Bulgaria's infrastructure was exposed. France, on the other hand, remained a capitalist state and therefore the Olympics helped its' development *relative to Bulgaria.*

I believe that though my regression accounts for the initial state of the economy, capturing the effect of transitioning from a Communist state to a capitalist country is not accounted for; in particular, I treat all years as equal, renumbering (in this case, 1982) to year -10 to year +10 (in this case, 1992). This method, though helpful in determining the overall effect on host countries in general, can miss important historical events that occur, as happened in the 1992 case.

By using narrative evidence, I am able to confirm that, unlike other pairs of countries, the 1992 France/Bulgaria pair is an anomaly in which the increase in France's GDPpc relative to Bulgaria is *not* attributable to the Olympics. Excluding this pair from analysis, therefore, results in a more accurate measure of the effect of the Olympics. I conclude that there is a statistically significant, negative impact of the Games on host countries in general.

5.3 Difficulties and Possible Improvements

5.3.1 Expanding the Data

The impact on host countries' citizens may not be very large in comparison to the impact that there could be on countries not included in my data set. In particular, of the countries analyzed in this paper, nearly all are developed

countries (the only exception is Mexico, who hosted the Games in 1968). I believe, therefore, that in the past, the process of bidding for the Olympics created a natural self-selection problem in which developed, wealthier countries were the countries engaged in the bidding process and eventually hosted the Games. This trend is changing only recently: less-developed countries are now hosting mega-events, like China (who hosted the Olympics in 2008), India (who hosted the Commonwealth Games in 2010), South Africa (who hosted the World Cup in 2010), and Brazil (who will host the Olympics in 2016). In order to accurately quantify the long-run economic impacts on host countries in general, additional data on less-developed host countries are necessary.

This paper presents data on only a portion of the Olympic Games that have occurred; thus the analysis is limited by constraints in the data set. One way to avoid this problem would be by collecting additional data from previous years and including more Olympic Games than were included in this paper; this, however, may be only doable in a few years, when additional data is available for the Games after 2002 and an accurate method is developed to handle the data on Yugoslavian and Russian GDP per capita.

Analysis of the impact of Olympics on host countries *before* 1960 would need to control for the advent of televised Games that occurred in 1960. It is possible that there would be a larger increase in the international awareness of host countries than existed before 1960. As television broadcasting rights became more valuable to host countries and TV networks, government expenditure on the bidding process in preparation for the Games increased dramatically ("Olympics and Television"). Future studies including more data would therefore need to include the binary variable Televised (1 if Olympics hosted before 1960), in order to control for the role of televised Games.

Table 5. Television broadcasting rights and its role in the Olympics
From "Olympics and Television"

Year	Games	Location	Network	Hours	Revenue
1960	Winter	Squaw Valley	CBS	15	$50,000
	Summer	Rome	CBS	20	$394,000
1964	Winter	Innsbruck	ABC		
	Summer	Tokyo	ABC	14	$1.5 million
1968	Winter	Grenoble	ABC	27	$2.5 million
	Summer	Mexico City	ABC	44	$4.5 million
1972	Winter	Sapporo	NBC	37	$6.4 million
	Summer	Munich	ABC	63	$7.5 million
1976	Winter	Innsbruck	ABC	44	$10 million
	Summer	Montreal	ABC	77	$25 million
1980	Winter	Lake Placid	ABC	54	$15.5 million
	Summer	Moscow	NBC	150	$87 million
1984	Winter	Sarajevo	ABC	63	$91.5 million
	Summer	Los Angeles	ABC	180	$225 million
1988	Winter	Calgary	ABC	95	$309 million
	Summer	Seoul	NBC	180	$300 million
1992	Winter	Albertville	CBS, TNT	116, 50	$243 million, $50 million
1994	Summer	Barcelona	NBC	50	$401 million
	Winter	Lillehammer	CBS, TNT		$300 million, $50 million
1996	Summer	Atlanta	NBC		$456 million
1998	Winter	Nagano	CBS		$375 million

5.3.2 Econometric Issues

In analyzing the independent variables of regression (2), it is important to note that omitted variable bias may exist. In particular, analysis of the Games often fails to account for the substitution effect and leakages, where reshuffling of spending and actual returns to taxpayers remain exaggerated in the analysis because of inaccurate measuring techniques (Matheson, 2006). In an effort to control for this substitution effect, one could study the number of tickets purchased for sporting events per year. If there is a spike in sporting-event tickets in the host country during the Olympic year, then this spike would account for the sudden increase in spending and control for the substitution effect. Leakages, on the other hand, prove harder to capture.

6 Conclusion

The preceding analysis provides insight into the economic impact of the Olympic on host countries. While the results are consistent with current research, they also provide a better understanding of the long-run macroeconomic effects of host countries in general. Most notable is the fact that the impact on host countries is negative.

This trend may, in part, be due to the fact that host countries experience a one-time increase in demand for domestic investment (as governments engage in building infrastructure), and a spike in consumption of domestic assets. After the Olympics and for the several years after, countries may return to their pre-Game normal output levels instead of to higher normal output levels. Current literature suggests that this "return to normal" is captured by a reverse multiplier, resulting in a decrease in long-run GDP per capita. However, because my data does not include less-developed countries and GDPpc data of more recent

Olympics, it is challenging to determine the drivers of this difference. Furthermore, the difficulty in measuring the substitution effect and leakages (Matheson, 2006) possibility of omitted variable bias may exist. Ultimately, these results provide a launching pad for additional research in the realm of the long-run economic impact of the Olympics on host countries in general.

By exploring GDP per capita levels for host countries versus runner-up countries, I attempt to quantify the impact of hosting the Games. In particular, I hope to provide researchers and governments with a better idea about the general effects of the Olympics, rather than a case-by-case analysis. As a result, potential bidding countries and researchers can better assess the economic impact of the Games on their citizens and focus investment in areas that will contribute to the growth of the country rather than hamper it. The Olympic Games can be wielded as a method to increase normal output above the current level if policy makers strategically align their expenditures with infrastructure (like stadiums for universities) that will have a long-run economic benefit. Further, my results question whether the driver of this negative impact stems from investment allocation or from revenues from increased international awareness. In conclusion, my analysis opens the door to future research that explores the reasons why countries that host the Games experience long-run, negative impacts on output levels.

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A Appendix

A.1 Table A

Table A. Data for Host Countries

year	japan72	germany72	usa76	canada76	usa80	usa84	canada88	southkorea88	france92	spain92	norway94	usa96	japan98	average	hostnormt01
-10	633.640	2035.105	3972.123	3010.706	4997.757	6948.198	8931.293	1382.921	10285.49	5015.465	14758.11	18427.29	2423	8549.498	0.818317908
-9	717.8669	2072.217	4152.02	3173.076	5360.178	7516.68	9831.079	1746.73	9781.433	4354.135	15472.48	19394.2	24145.25	8803.761	0.842654761
-8	835.6572	2188.065	4491.424	3411.06	5836.224	8297.292	10933.73	1674.388	9246.708	4366.061	18518.32	2069	2475	9421.928	0.901822831
-7	919.7767	2279.738	4802.643	3703.99	6461.736	9142.795	12075.02	1845.654	9610.317	4570.409	22079.72	2203	2812	10447.65	1
-6	1058.504	2322.386	4997.757	4047.269	6948.198	10225.31	12217.37	1938.112	13388.15	6335.019	23772.17	2305	3055	11544.93	1.105027705
-5	1228.909	2309.854	5360.178	4503.181	7516.68	11301.68	13113.17	2117.53	16176.12	8015.911	23839.72	2349	3492	12632.96	1.209167771
-4	1450.62	2427.053	5836.224	5048.482	8297.292	12179.56	13506.37	2306.86	17511.43	9439.678	27731.81	2452	3824	13839.93	1.324693046
-3	1669.098	2583.504	6461.736	5764.261	9142.795	13526.19	13711.52	2367.782	17418.83	10387.58	28077.39	2544	41967	14661.86	1.403365024
-2	1974.171	2687.499	6948.198	6915.889	10225.31	13932.68	14076.75	2702.641	21382.16	13414.57	29931.64	26719.14	36915.61	15428.23	1.47671795
-1	2201.392	3087.093	7516.68	7354.269	11301.68	15000.09	15876.84	3367.543	21278.3	14391.62	27404.53	27637.66	3379	15594.19	1.492603303
0	2874.736	3685.727	8297.292	8624.614	12179.56	16539.38	18522.66	4465.67	23364.66	15680.04	28713.56	2889	30512.11	16555.05	1.584633567
1	3873.467	4882.617	9142.795	8731.679	13526.19	17588.81	2028	5438.252	21881.58	13009.1	34155.93	3036	3449	17707.79	1.694926177
2	4218.375	5456.212	10225.31	8931.293	13932.68	18427.29	20968.04	6153.094	23039.37	13109.74	36557.48	31687.05	3678	18669.22	1.786996569
3	4514.173	6034.591	11301.68	9831.079	15000.09	19394.2	21234.38	7122.701	26421.36	15150.96	35926.31	3333	3221	19281.14	1.846023018
4	5036.101	6422.276	12179.56	10933.73	16539.38	20698.24	20320.47	7555.272	26390.9	15766.41	34101.79	3508	3074	19612.53	1.877199811
5	6138.679	7434.309	13526.19	12075.02	17588.81	22038.82	19549.02	8219.896	23806.13	14466.97	35660.38	3589	33112.09	20173.77	1.9309032.4
6	8547.392	9176.937	13932.68	12217.37	18427.29	23053.96	19390.49	9525.436	24508.73	15126.43	37472.37	3679	36051.57	21254.07	2.034347654.15
7	8821.871	10919.92	15000.09	13113.17	19394.2	23492.67	20117.1	11467.81	24170.49	15475.53	37873.45	38195.68	3562	21895.78	2.095761180
8	9170.907	11744.24	16539.38	13506.37	20698.24	24526.93	20684.95	12249.17	21914.07	14421.94	42293.31	4030	34147.82	22538.48	2.157277942
9	10062.14	9878.186	17588.81	13711.52	22038.82	25447.54	21260.29	11234.78	21991.28	14958.3	49313.3	4253	3426	23704.05	2.268493025
10	9290.162	9593.457	18427.29	14076.75	23053.96	26719.14	20390.39	7462.839	23751.3	16610.54	56311.5	4466	3826	24918.77	2.385108111

Real GDP per capita in billions of current USD, inflation adjusted
Sources: World Databank, Bureau of Labor Statistics

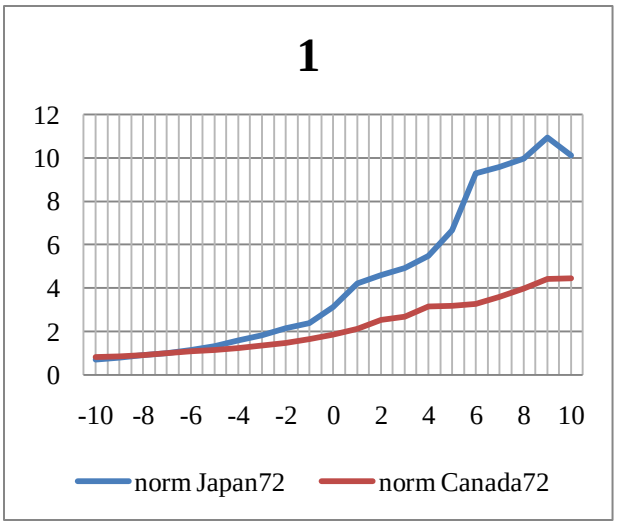
A.2 Table B

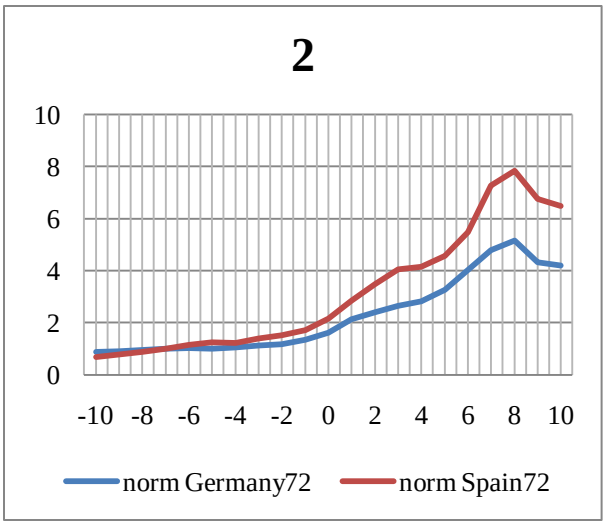
Table B. Data for Runner-up Countries

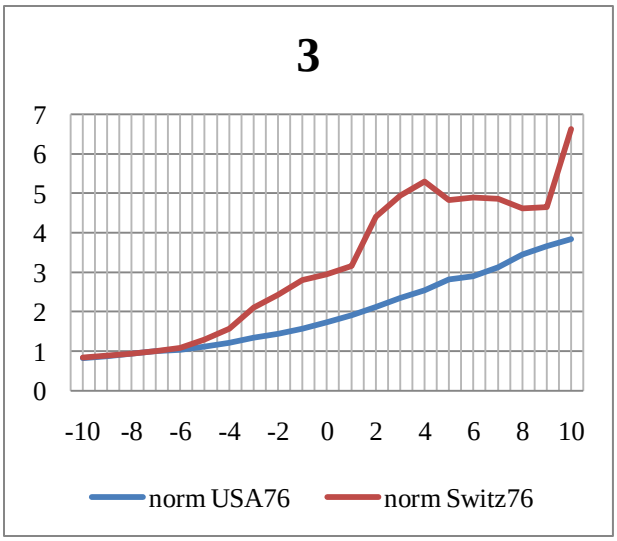
year	canada72	spain72	switz76	canada80	usa80	japan84	sweden88	japan88	bulgaria92	france92	sweden94	greece96	usa98	average	runnerup normto1
-10	2255.23	519.4755	2784.734	4047.269	4997.757	4218.375	11717.28	8547.392	2226.68	10285.49	12167.4	5445.024	20698.24	6916.1805	0.797188 79
-9	2354.839	607.6168	2960.616	4503.181	5360.178	4514.173	13807.21	8821.871	1903.624	9781.433	12719.7	6317.148	22038.82	7360.800754	0.848437 638
-8	2529.518	672.8192	3121.742	5048.482	5836.224	5036.101	15869.82	9170.907	1950.83	9246.708	16800.75	7311.588	23053.96	8126.880708	0.936739 317
-7	2739.586	772.2794	3344.995	5764.261	6461.736	6138.679	14466.99	10062.14	1964.224	9610.317	20415.88	7550.501	23492.67	8675.712185	1
-6	3010.706	886.6167	3648.086	6915.889	6948.198	8547.392	12748.67	9290.162	2262.053	13388.15	22972.12	9270.822	24526.93	9570.445746	1.103130849
-5	3173.076	966.767	4344.391	7354.269	7516.68	8821.871	11709.86	10063.7	3168.992	16176.12	24066.49	9861.558	25447.54	10205.48569	1.176328292
-4	3411.06	951.5266	5277.497	8624.614	8297.292	9170.907	12167.4	10628.1	2561.236	17511.43	28561.55	10785.27	26719.14	11128.23251	1.282688069
-3	3703.99	1078.132	7046.664	8731.679	9142.795	10062.14	12719.7	11297.05	2449.793	17418.83	29923.98	10004.51	27637.66	11632.071	1.340762666
-2	4047.269	1178.303	8105.676	8931.293	10225.31	9290.162	16800.75	16633.91	2377.415	21382.16	30819.72	10632.63	28894.11	13024.516	1.501261882
-1	4503.181	1323.92	9347.933	9831.079	11301.68	10063.7	20415.88	20056.14	1267.788	21278.3	23173.19	12386.53	30363.79	13485.62392	1.554411169
0	5048.482	1666.693	9868.701	10933.73	12179.56	10628.1	22972.12	24230.98	1214.508	23364.66	24775.52	13007.14	31687.05	14736.71108	1.69861687
1	5764.261	2193.466	10571.83	12075.02	13526.19	11297.05	24066.49	24145.25	1278.565	21881.58	28726.07	12608.99	33332.14	15497.454	1.78630338
2	6915.889	2687.216	14761.39	12217.37	13932.68	16633.91	28561.55	24754.03	1150.549	23039.37	31262.71	12599.33	35080.73	17199.748	1.98251712 8
3	7354.269	3137.887	16556.22	13113.17	15000.09	20056.14	29923.98	28120.9	1555.844	26421.36	28609.49	12350.27	35898.09	18315.20846	2.11108991
4	8624.614	3201.82	17738.26	13506.37	16539.38	24230.98	30819.72	30557.39	1063.944	26390.9	28776.43	11500.65	36796.57	19211.30985	2.214378 421
5	8731.679	3536.195	16168.7	13711.52	17588.81	24145.25	23173.19	34929.76	1209.503	23806.13	29220.04	11966.42	38195.68	18952.529	2.184550 224
6	8931.293	4239.851	16366.75	14076.75	18427.29	24754.03	24775.52	38243.87	1581.783	24508.73	27879.15	13414.1	40308.69	19808.29285	2.283189 256
7	9831.079	5615.134	16262.99	15876.84	19394.2	28120.9	28726.07	41967.65	1611.644	24170.49	25563.24	17654.71	42534.48	21333.03285	2.458937 364
8	10933.73	6045.136	15438.07	18522.66	20698.24	30557.39	31262.71	36915.61	1600.936	21914.07	28122	20857.33	44663.47	22117.79631	2.549392 584
9	12075.02	5217.536	15561.54	20289.77	22038.82	34929.76	28609.49	33799.73	1753.3	21991	35139.95	21880.08	46627.1	23070.23815	2.659175139
10	12217.37	5015.465	22150.27	20968.04	23053.96	38243.87	28776.43	30512.05	2030.651	23751.3	40268	23682.01	47208.54	24452.15046	2.818460 311

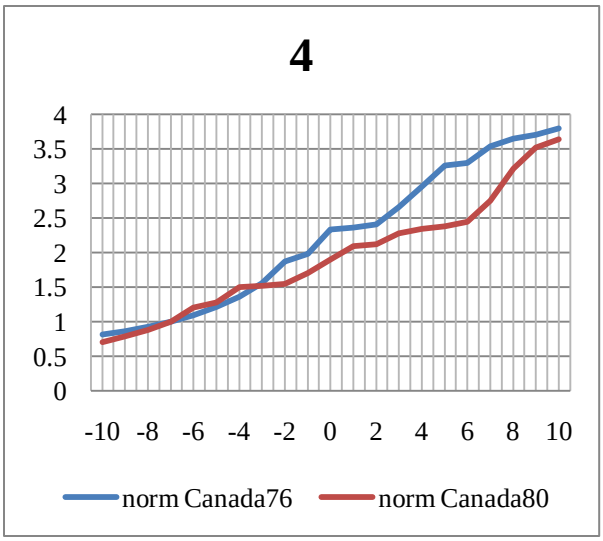
Real GDP per capita in billions of current USD, inflation adjusted
Sources: World Databank, Bureau of Labor Statistics

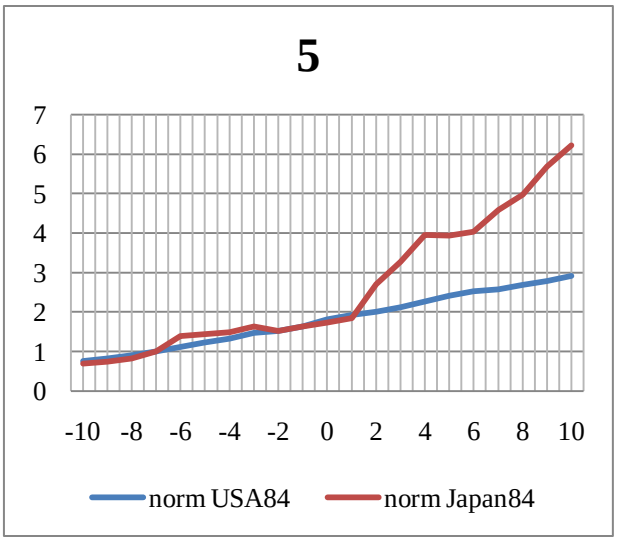
B.1 Figures 1 – 6 Each graph of normalized GDPpc (to year -7) corresponds to the pair labeled in the legend, with year on the x-axis

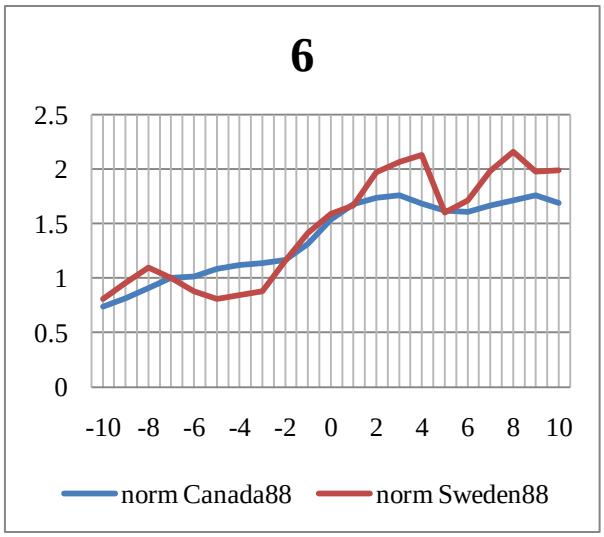












B.2 Figures 7 – 12