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Hailey Ahn April 7, 2022

# News Shocks in Olympics Bidding

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An abstract of

a thesis submitted to the Faculty of Emory College of Arts and Sciences

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Abstract

News Shocks in Olympics Bidding

By Hailey Ahn

The Olympic Games are slowly losing its popularity despite its historical significance. There have been increasing numbers of studies and news articles questioning the economic benefits for hosting the Olympics, resulting in fewer countries bidding to host the Games in their own country. This paper investigates the macroeconomic outcomes of hosting the Olympic Games with news shocks in Olympics bidding through the Local Projection method from data of 183 countries throughout 1950 to 2019. The results from this paper demonstrates that GDP and capital stock increases, while employment and total factor productivity levels remain consistent as a result of winning the bids for the Olympics. This suggests capital deepening to be occurring, as GDP is a result of a high level of output per worker. In addition, the increase in investment suggests that countries are getting money from increases in imports into the country, as well as a decrease in consumption relative to GDP. Therefore, the paper suggests that hosting the Olympics is economically beneficial for the countries, and the benefits start to present themselves immediately after the bidding procedure. In conclusion, this paper provides valuable insights into the changes in the economy after the bidding news of the Olympics, potentially changing people's opinions on the negative scope associated with hosting.

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# 1 Introduction

The Olympic Games are a global event recurring every four years featuring both summer and winter sports, each officially lasting around two weeks. The games are a massive networking opportunity for athletes, business leaders, and government officials (Boykoff, 2014). From economists and politicians' perspectives, the Olympics is not merely a sporting entertainment event, but a combination of opportunities to change their cities' reputations, bring in increased tourism, as well as labor forces into the area (Kasimati, 2003). For example, the South Korean President in the 1960s and 70s bid on the Olympics as a means to create national revival from post-war, post-colonization trauma (Bridges, 2008). Researchers have found that countries that have a high unemployment rate but expected development, significantly benefit from hosting the Olympics (Hiller and Wanner, 2019).

Due to these factors, cities have been competing and bidding to host the Olympic Games in their respective countries, with hopes that it will bring awareness, attention, tourism, and many more economic advances (Kasimati, 2003). The International Olympic Committee (IOC) selects the host city of each game seven years prior to each event. The process itself is discrete and involves several rounds of voting, to best appoint the city that would produce the most revenues and recognizable benefits for the country (Maennig and Vierhaus, 2017). Despite this ongoing tradition for over a century, many economists and government officials of countries have still yet to decide whether the Olympics truly brings any economic benefit for the city (Brückner and Pappa, 2013; Zimbalist, 2015).

The paper discusses how hosting the Olympics may start to have an impact on the country's economy from the beginning of the bidding process, instead of measuring the changes in economy after the Olympic Games. Using Oscar Jordà's Local Projection (LP) method of an impulse response function (IRF), this paper finds the changes in various trends after the news of the bidding. Using the available data of macroeconomic variables of countries all around the world, the research further explores how the countries that bid experience capital deepening, crowding out, and over-expenditure through the span of bidding, preparing, and hosting the Olympics. As a result, we find that hosting the Olympics is economically beneficial for the countries that are chosen to host the Olympics – and these benefits ultimately start to present themselves starting from the bidding stages of the Olympics. The paper will discuss how this unfolds with the use of productivity of output and expenditure of the country.

## 2 Background

### 2.1 Economic Costs and Benefit

Recently, researchers have found that while the economical hosting benefits have been vastly minimal, many cities still bid for the sake of gaining a positive reputation as an honorary host (Owen, 2005; Brückner and Pappa, 2015; Maennig and Vierhaus, 2017). Boykoff (2014) said "the brutal truth for the IOC is that fewer and fewer cities are to host the Olympics" (Hersh, 2018). There are controversial opinions of whether the Olympics provide economic benefits, and this news has become increasingly popular due to the recent outbreak of Covid-19, ultimately postponing the 2020 Tokyo Olympics. There has been an increase in conversation on the lack of impact the Olympics has not only due to the decrease in viewer ratings of Olympics

broadcasters, but also a surge in multiple entertainment and social media sources elsewhere on various platforms.

However, contrary to popular belief, the recent Olympics, such as the 2010 Vancouver Olympics and 2016 Rio Olympics, the costs have remained under $10 billion, even while the costs of the broadcasting rights have increased from a couple million dollars to $3 billion (Scandizzo and Pierleoni, 2018). In addition, every Olympics since the 1972 to 2018 has had an operational surplus in costs in the Organizing Committee for the Olympic Games (OCOG). Also, because many countries have changed the vision of hosting the Olympics for cultural expansion for the future, the goal has shifted less from an economic standpoint to a long-term cultural perspective.

The cost and benefit analyses of hosting the Olympics includes several endogenous variables that are directly related to each hosting country. Some of these variables include sponsorship from companies, building new stadiums, temporary housing for athletes, adding roads, and enhancing airports, mostly facility improvements encumbering tax dollars (Baade and Matheson, 2016). It is unfeasible to disregard the costs included in hosting a worldwide sporting event including costs for infrastructure, facilities, security, services, transportation, advertisement, and so much more. It could also include some social and environmental costs that may not be evident during the time of the games but could impact the cities' ambience long-term. In reality, underdeveloped countries are more likely to have to invest in transportation, telecommunications, hospitality, security, and sports infrastructure in comparison to developed countries (Zimbalist, 2020). The IOC and international sports federations (IFs), in the prior bidding process, required to build infrastructure that cost tens and billions of dollars, which does not typically correspond to the

development needs of a city (Zimbalist, 2020). But there are also confounding variables that inevitably occur with the circumstance of each time period, like the Covid-19 pandemic. The 2020 Tokyo Olympic was delayed until after an entire year due to the pervasiveness of Covid-19 globally (Suenaga and Takeda, 2021). The Olympics didn't allow any in-person audiences, which is usually a big revenue source for the Olympics – especially since the audience that come to the stadiums also vastly contribute to the tourist revenues for the cities. Opportunity costs are also difficult to calculate considering the time and effort each country spends on hosting the event. Ultimately, keeping all these variables in mind, this paper will examine how the impact of the news of a country's bid impacts different macroeconomic variables of the countries.

The beginning of this significant increase in financing for the Olympic Games began in 1976 (Zimbalist, 2011). In the summer of 1976, Montreal, Canada hosted the Games and acquired a debt of 2.8 billion dollars, which took approximately 30 years to pay off (Zimbalist, 2011). At a similar time, during the bidding process of the 1976 Denver Olympics, there were "citing escalating costs, a tax hike, potential ecological scarring, and a population explosion that could raise the cost of living" and thus the activists convinced voters that the Olympics would be dangerous and harmful for Denver and the surrounding areas (Boykoff, 2014). Due to this, no other city wanted to bid for the next set of Summer Games which was supposedly the 1984 LA Olympics that is now renowned for the Olympics that had spent the least amount of money. During the bidding process for the 1984 Games, LA agreed to host with an agreement with the IOC to not have no financial obligation (Zimbalist, 2011). The US had just focused on receiving money for the global television rights and money from corporate sponsors, with minimal costs (Bridges, 2008). As a result, a lot of countries and people in the media believed that hosting the

event generated billions of dollars in profit because mainly there were already several facilities (Baade and Matheson, 2004). Subsequently, despite the false inaccurate information, the reputation for hosting the Olympics had revived again, and there had also been changes globally with host country benefits for increased TV commercialization and sponsorship, an aspect of the Games that was not present before (Zimbalist, 2011).

This ongoing debate and analysis of case studies from past Olympics suggest that hosting the Olympics is extremely complicated and that the costs and benefits of hosting the Olympics is not black and white. The cases above and the scope of the research regarding the economic implications of hosting the Olympics has also shown unfortunate results. The current consensus of the view on Olympics is that “the contemporaneous and post-hosting effects of the Olympic Games on output and aggregate demand is limited" (Brückner and Pappa, 2013). In other words, cities and countries nowadays usually invest in the Olympics mostly because of the prestige more than anything else (Baade and Matheson, 2004).

## 2.2 Process of Bidding

The first step of the bidding process involves the IOC sending out invitational letters to the National Olympic Committees (NOCs) to submit the bids, typically about 7-9 years before the actual Olympics. The NOC of each country plays the role of deciding the one city that will represent the country for the bidding process (in case there are multiple cities within the same country wanting to bid for the same Olympics). Once the NOC picks the cities, they submit applications and financial guarantees from stakeholders as the first document round, reviewed over 3-4 months. While the criteria are not certain, there are potential variables that the IOC

seems to look at for successful bids, including government support, transport facilities, accommodation facilities, finance, telecommunication, security, and more (Maennig and Vierhaus, 2017). A few more cities make it to the next round, in which once again cities present a detailed proposal regarding their hosting project, as well as a direct evaluation of the site by IOC commissioners. IOC members vote for each candidate cities in a democratic way preceding these courses of action. The city above 50% of the vote will be elected (Jain, 2021).

Bidding for the Olympics has always been a competitive process. According to McBride (2018), submitting a bid to the IOC to host the Olympics costs an average of $75 million on a successful bid. Tokyo's 2016 bid for the 2020 Summer Olympics was a mere $150 million, leaving the country in major losses due to the struggles throughout the pandemic (McBride, 2018). While it may be due to the costs, it wasn't until the 2016 Rio Olympics that both biddings for winter and summer Olympics have decreased from an average of 7 to only 2 bids each for 2022 Winter and 2024 Summer (McBride, 2018). In 2013 and 2014, the newest IOC president Thomas Bach made continuous efforts to convince cities to bid for the Olympics, also by making new approaches for host election processes (Zimbalist, 2015). Before 2014, the biggest problems that the IOC recognized from the bidding process were (1) high costs from cities trying to outbid each other and (2) reputational risk involving lobbying and ethical problems. According to the IOC, bidders were required to find and use existing or temporary venues, other than having to build everything from scratch.

Winning the bid is an indicator for the cities to plan their next seven years catering efficiently to successfully hosting the Olympics. Therefore, we predict that the decision of being selected to

host the forthcoming events will have an impact on the city even prior to the games. From this, we hypothesize that the results of the bid has a direct effect on various economic factors such as national spendings, inflation rates, employment rates, and capital.

2.3 What is News Shock?

"A news shock implies potential impacts on the dynamic adjustment process that change not only the volatility but also the long-run steady state levels of endogenous economic variables" (Langer, Maennig, & Richter, 2018). In other words, it is expected that businesses or the economy is impacted solely and directly by the basis of expectations, thus news stories (Barsky & Sims, 2011). Implying this to the Olympic bidding results, there will already be a difference between the cities that lost the Olympic bids versus those that had won the bids. "Agents receive a signal today regarding economic developments tomorrow, such as higher productivity growth, and immediately adjust their contemporaneous investment, consumption, and work decisions" (Féve, Matheron, & Sahuc, 2008).

In relation to the Olympic Games, economists have started to wonder whether there are news shocks involving the announcements of the bids (Langer, Maennig, and Richter, 2018). To answer the question regarding the delayed effects of the economic results of the Olympics, Brückner and Pappa went through different news shock analysis from the start of the bidding process. The results indicate that the ex-ante effects of hosting the Games on economic growth are statistically significant. The Olympics is an event in which even the process for bidding is associated with huge anticipation, so the decision to apply, winning a bid, and hosting the games, all have an impact in several macroeconomic variables, starting from at least 7 to 9 years before

the actual event (Brückner and Pappa, 2015). Following the bidding process, the country starts to plan specific itineraries for their financial reports, sponsorships, where they will create new facilities, and more. Due to this, it is inevitable for the economic scope of the city to change immediately following the result of the bid. The countries that had lost the bid, on the other hand, will see changes in their anticipated government spending and expected "savings" and "expenses" from sponsorship companies and all other corporations involved. With this expectation, the paper will delve into the news shock of the bidding news of hosting the Olympics and its economic implications.

We will discuss how the timing of new information, impacts macroeconomic factors including gross domestic product (GDP), inflation rate, consumption levels, unemployment levels, and more. Specifically, the paper will explore how the delivery of news of a particular city winning the bid for the Olympics will impact the forthcoming economy of the country.

### 2.4 Importance & Motivation

In the midst of the debate of whether hosting the Olympics is worth the monetary costs that follows, it is important to see whether this is effectively calculated. Would the economic changes occur post the Olympics? Or directly before the events begin when a surge of tourists start coming in? Or would it be after several weeks, after the nearby commercial areas start receiving their public attention? Before writing this paper, we've decided that this could be effectively calculated around the time when the news about the bids have been decided.

Personally, this topic was compelling to me because it was noticeable that the Olympics earned less media attention progressively throughout the past couple of years. According to NBC news viewer ratings, the 2020 Tokyo Olympics had 42% less viewers than the 2016 Rio Olympics. While the usage of cable TV had also significantly decreased during the same period, it is still surprising to see a huge change in people's interest in a short amount of time. The Olympics is one of the few events in the world which involves entertainment participation from most countries in the world. The only one UN-recognized country that was never represented in the Olympics is Vatican City, but at least one athlete from each country usually joins. After researching a little bit more about the trend regarding less attentiveness in the Games, there were several news stories about less countries bidding for the Olympics – only two or three in recent years. Looking into the process of bidding, I found out that there were several problems in the previous selection process. In efforts to change this, the IOC, led by Thomas Bach, made reforms starting 2014, and was unanimously approved by 2019. With these recent changes, it would be interesting to see the trajectory of where this takes the IOC and the future of the Olympics.

While the Olympic Games were exploited to be used against political problems previously, it is also one of the very few global events that promotes a "cessation of hostilities and the deferment of conflict" (Kim, 2020). It is important to continue the legacy of the Olympics, as the Games have been making sure to allow athletes to travel safely to participate in the tournaments. By the time Seoul, South Korea won the Olympic bids to host in the 1988 Olympics, 37 countries with NOCs did not have formal diplomatic relationships with the country (Bridges, 2008). After the 1980 Moscow Olympics boycott initiated by the United States and the 1984 LA Olympics boycott initiated by the USSR, the 1988 Seoul Olympics was the first game in a long period of

time in which most of the boycotting countries came together to participate in the global event. While this event was controversial, gestures like this are a way for athletes and fans from respective countries to come together, build companionship with others, and learn more about each other.

There is only a few existing literature that discusses the bids for the Olympics, but even fewer includes a time series analysis considering the bidding process of hosting the Olympics. However, this paper will differ in that we will use the LP method that is the most appropriate for a panel dataset such as the information on the countries that bid over the years. In addition, whereas existing literature had worked with data ranging from 1950 to 2010 (Brücker and Pappa, 2015), this paper will fill in the gap of data up to 2019, a 9 year period that makes up for recent economic trends.

The paper is organized as follows. The methods section will start off with a description of the two datasets used: Olympic bidding history and the Penn World Table. Methods will also explain how Jordà's Local Projection (LP) is used to calculate the news shock of the Olympic bid results. Summary statistics in section 4 shows a basic visual description of the type of data this paper employs. Section 5, impacts of the economy, includes an explanation of the empirical results, along with how the findings correspond with basic macroeconomic assumptions. Last but not least, section 6 is the conclusion which consists of limitations and advancements in literature that could be made for future studies.

# 3 Methods

## 3.1 Local Projection Method

Since Oscar Jordà had introduced Local Projections (LP) in 2005, a new methodology to estimate impulse responses, there has been a lot of debate about the pros and cons regarding the efficiency of Vector Autoregression (VAR) estimation (Li, Plagborg-Møller, Wolf, 2021). There are many different ways to calculate news shocks. VAR, created by Christopher Sims, is used to calculate how the economy responds to different macroeconomic variables, such as government spending, and how it impacts other variables like GDP, consumption, and real wage (Rotemberg and Woodford, 1992; Blanchard and Perotti, 2002; Fatas and Mihov, 2001; Mountford and Uhlig, 2002; Perotti, 2005; Caldara and Kamps, 2006; Gali, López-Salido, and Vallés, 2007; Ramey, 2011). VAR approaches became ubiquitous to study the effects of both monetary policy (Bernanke and Mihov, 1998) and fiscal policies – the use of government spending and tax policies to impact macroeconomic variables. Regardless, this paper will use the LP, because it is arguably more preferable for panel datasets. Unlike VARs, which were originally optimally designed for “one-period ahead” forecasts, LPs don’t require estimation of unknown data generating processes, meaning that they are less impacted by misspecification and allow for non-linearities of the equation (Abbritti, Equiz-Goñi, Perez de Gracia, and Trani, 2020). In other words, they are more robust than VARs for misspecification (Calmès and Théoret, 2020). The Jordà method has also been used increasingly throughout the past couple of years. Starting from 2005, seminal papers using local projections have increased exponentially, from less than 20 citations in 2005 to nearly 200 citations in 2017 (Brugnolini, 2018). With recognition from scholarly papers and the attributes that match the purpose for our paper, we have decided that the

LP was the best method we can use to estimate impulse responses for Olympic bid news shocks. LPs for panel data can be estimated using:

$$y_{i,\,t+h} = \alpha_{i,\,h} + \gamma_{t,\,h} + shock_{i,\,t} + \beta'_h\, x_{i,\,t} + \varepsilon_{i,\,t+h} \qquad (1)$$

In which h = 0, 1, …, H (H = 20); we assume that the news winning the bid (win) is announced in year 0, and will start seeing impacts in year 1. $y_{i,\,t+h}$ is the outcome variable of interest indicated below in Table 1. Using OLS estimation with the LP method, $\alpha_{i,\,h}$ indicates the fixed effect of the country in its horizon, $\gamma_{t,\,h}$ is the fixed effect of year, $x_{i,\,t}$ is the vector of the control variables, and $shock_{i,\,th}$ indicates the shock variable, in this case the bidding and hosting of the Olympics. The fixed effect is important to note because it notes for observables that are specific to the country, that cannot be tracked with a large dataset including 183 countries, but are likely to impact the results. Therefore, by controlling for the country's fixed effects, it will lessen the impact. Bidding and winning for the Olympics will most likely not impact the countries' trajectory of macroeconomic variables significantly.

Table 1.

| **Variables** | **Definition** (Feenstra, Inklaar, and Timmer, 2015) |
|---|---|
| cgdpo | Output side real GDP at current price |
| ccon | Real consumption of households and government |
| cn | Capital stock |
| emp | Employment |
| inv | Investments |
| ctfp | Total factor productivity at current price |

| | |
|---|---|
| cda | Real domestic absorption (real consumption (ccon) + investment (inv)) |
| labsh | Share of labor compensation |
| csh_x - csh_m | Net exports (share of exports – share of imports) |
| csh_c + csh_g | Total share of consumption (household and government) |
| irr | Interest rates |
| bid | (binary) whether countries bid (1) or not (0) in that year |
| winner | (binary) whether countries won the bid (1) or not (0) in that year |
| host | (binary) whether countries hosted the Games (1) or not (0) that year |

## 3.2 Data Description

### *3.2.1 Games Bids*

This research consists of data from the Past Olympic Host Election Results database collected by Games Bids of both the Summer and Winter Olympics from 1920 to 2032. It includes most of the methods in which each of the cities had won (or lost) the bid. Most countries had gone through the bidding process indicated above in section 2.2, in which the IOC members had selected the cities for a majority (above 50%) vote. It also indicates whether the cities had withdrawn or had been eliminated during the process. Ultimately, the dataset includes observations for countries, cities, year of bid, year of which Olympic it was bidding for, Summer/Winter Olympics, the votes they had received to win from round 1 through round 6, withdrawn or eliminated status, winner (hosting country), and those that had lost the bid. For the final data we worked with, we included observations from 1950 to 2019 – a 70 year period. There are 43 countries that have attempted bidding for the Olympics during this time, although some countries applied with multiple cities (ex. The United States has bid for Los Angeles, Chicago, Salt Lake City, Atlanta, and more).

*3.2.2 Penn World Table (PWT)*

The Penn World Table (PWT) version 10.0 is a database with information with levels of income, output, productivity, GDP of 183 countries, starting from 1950 to 2019 (specific details are included in Table 1). The two datasets, Games Bids and PWT, are merged together grouped by the year and country. In total, we look at data of 183 countries in the world with GDP, output levels, income levels, consumption, and more from 1950-2019, merged along with the data from the first dataset (Games Bids), with information on bidding country (binary 0,1), winning country (binary 0,1), and host country (binary 0,1). The winning country is based on whether the country wins the bid for the indicated year. The host country is based on whether the country is hosting an Olympic that year. While Cuba (Bid Year: 2001 and 2005) and Andorra (Bid Year: 2003) have had experience in bidding for the Olympics in the past, the two countries were not included in the final merged dataset because the PWT didn't have corresponding information. Some countries had missing information of data from 1950 to 1970, but was replaced with NA with the purpose of finding patterns throughout a longer period. The goal is to find if any of the macroeconomic variables have shown significant change as a result of the country winning the Olympic bids versus those that did not, before the actual event of the Olympics. Some of the variables used were GDP per Capita, real consumption of households and government, real consumption plus investment, capital stock, and real domestic absorption.

# 4 Summary Statistics

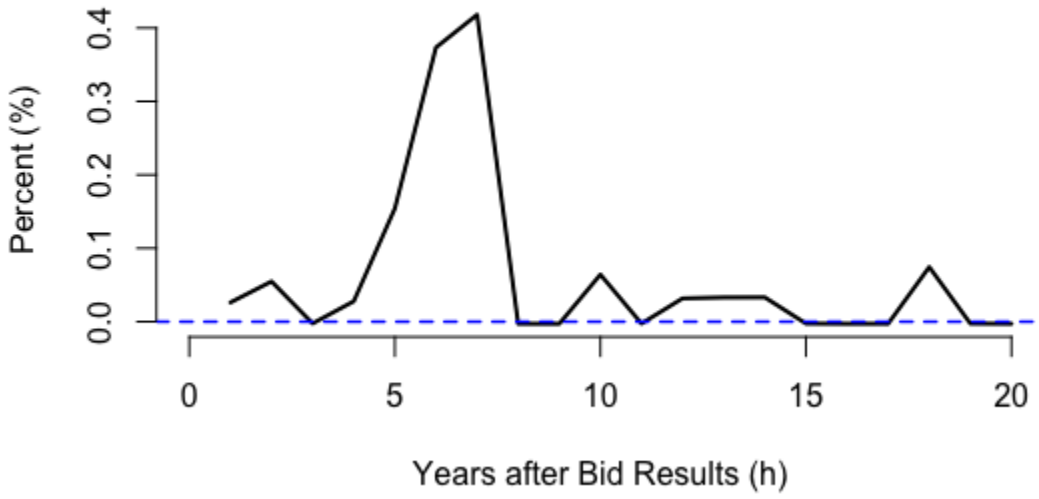



Figure 1. Impulse Response of the hosting effects of winning the bids.
Notes: Estimates of equation (1) when the y variable indicates the year of hosting Olympics.

The figure above shows the relationship between the variables "host" and "winning". Consider if a country wins the bid in a certain year. Based on the bidding process explained above in section 2.2, the "winning" effects would be represented around $h = 7$, since the bidding votes for the Olympics occur 7 years before the actual games. Figure 1 reaffirms this process, in which there is a 40% increase in the probability of hosting the Olympics 7 years down the line. The small fluctuations in years after the 7th year is based on countries that had won the bid for the Olympics previously for another game. For example, the US won the bid for the Denver Winter Olympics in 1970, and the Games were hosted 6 years after. However, during this time, they also bid and won the Lake Placid 1980 Olympics in 1974. Due to these overlaps in the constant bidding process, Figure 2 has a little bit of fluctuation over the horizons. In addition, there were constant changes to the Olympics bidding process, so the bidding pattern did not always occur consistently 7 years prior to hosting the Olympics.

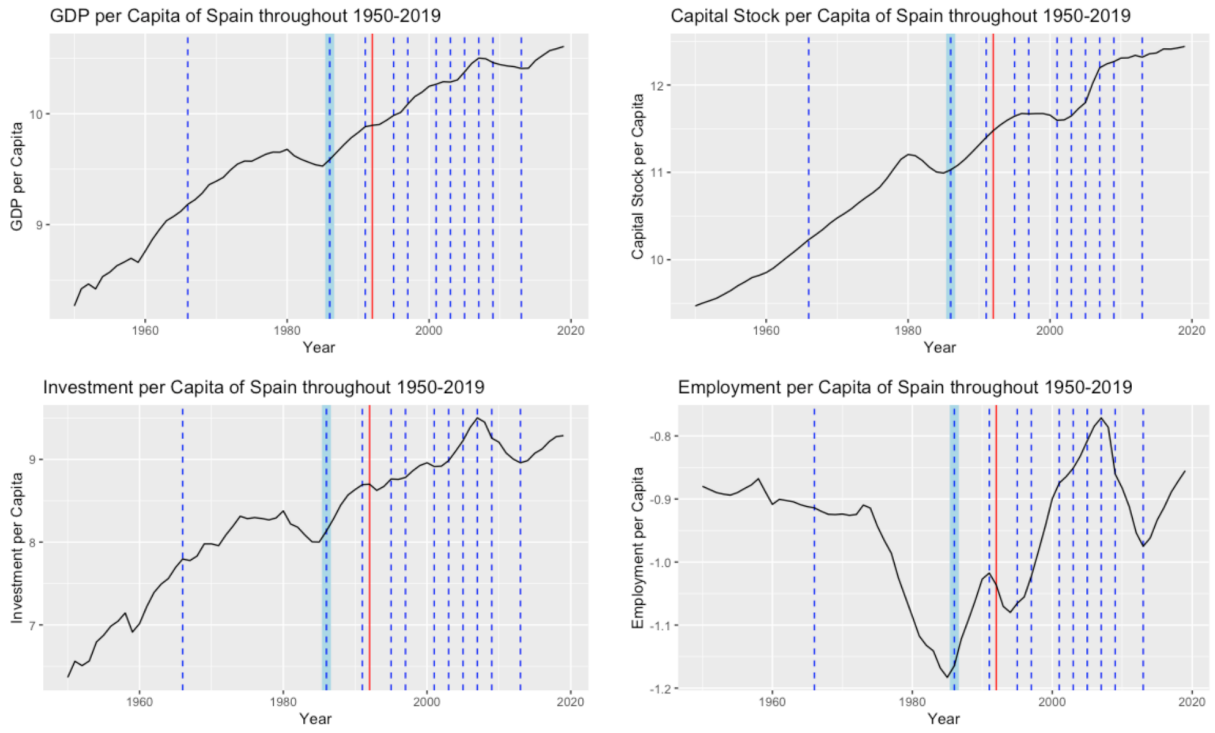



Figure 2. Per Capita Macroeconomic Variables (GDP, Consumption, Investment, Capital Stock) from 1950-2019 in Spain

Notes: The horizontal lines are indications of 3 different conditions: (1) *dotted blue line*: year that Spain bid for the Olympics, (2) *light blue line*: year that Spain won the bids, (3) *red line*: year that Spain hosted the Olympics. The x-axis is representative of real GDP, capital stock, investment, and employment (in millions) divided by population, and are all estimated with logarithmic functions. Important to remember that the bidding news or hosting news of the Olympics is not the sole indicator to the changes in these rates.

Figure 2 is representative of Spain's economic trajectory over the years 1950 to 2019. The top left, top right, and bottom left graphs (respectively representing GDP per capita, capital stock per capita, and investment per capita) all show similar patterns. We observe a decrease right before winning the bid for the Olympics and then a significant increase until the year of hosting the Olympics. After Spain hosts the Olympics, the increasing pattern dwindles, but still goes up. Employment per capita (bottom right graph), on the other hand, has a significant increase after the news of the bids until the year before the Olympics is hosted, but is followed by a significant decrease immediately (1 year) before the Olympic Games.

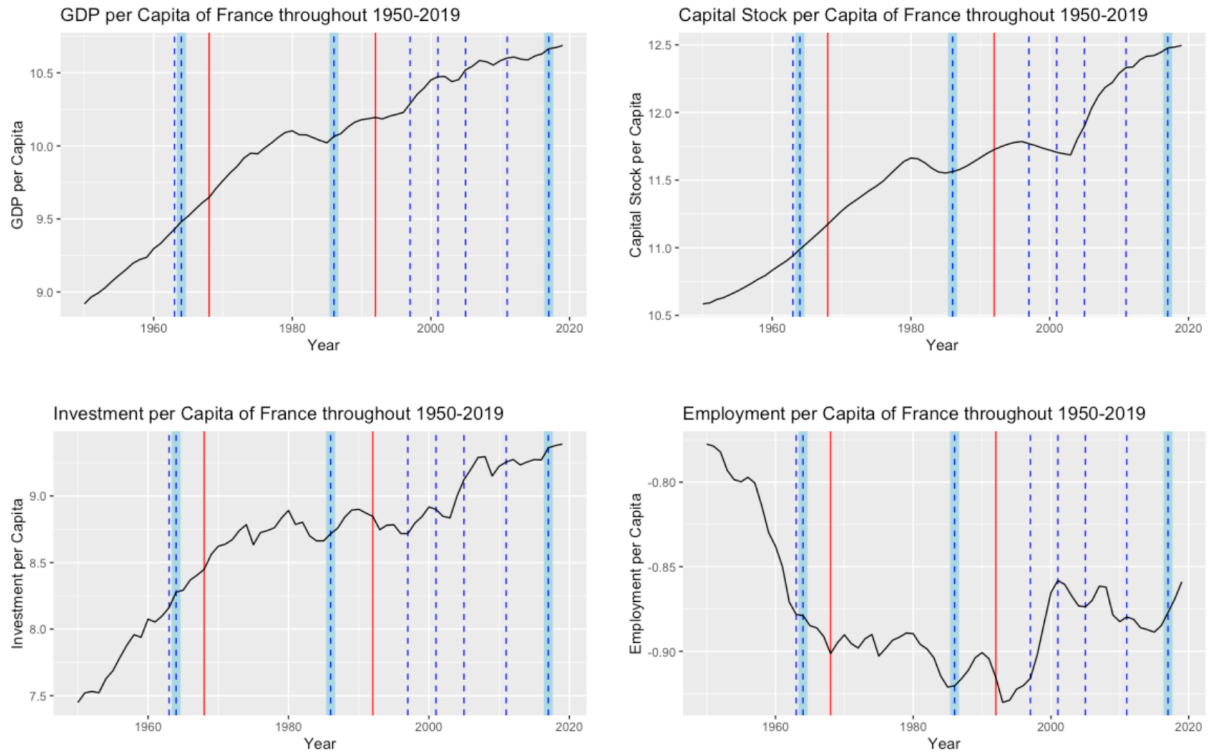



Figure 3. Per Capita Macroeconomic Variables (GDP, Consumption, Investment, Capital Stock) from 1950-2019 in France

Notes: The horizontal lines are indications of 3 different conditions: (1) *dotted blue line*: year that France bid for the Olympics, (2) *light blue line*: year that France won the bids, (3) *red line*: year that France hosted the Olympics. The x-axis is representative of real GDP, capital stock, investment, and employment (in millions) divided by population, and are all estimated with logarithmic functions. Important to remember that the bidding news or hosting news of the Olympics is not the sole indicator to the changes in these rates.

Figure 3 includes observations for France of the same variables as in Figure 2. Once again, we see an increase in GDP per Capita in all three timelines (1964, 1986, 2017) when France won the bids for hosting the upcoming Olympics. GDP per capita, capital stock per capita, and investment per capita (top left, top right, bottom left graph of Figure 3) all show a positive pattern during the time of the bid until the year of the Olympic Games. Employment per capita decreases in preparation for the first Olympic Games shown on the graph. However, as we observed in the employment per capita for Spain, in preparation for the second France Olympic

Games, there is a sudden increase in employment per capita, but decreases a year or two before the actual hosting year.

Figures 2 and 3 indicate an increase in GDP and capital stock per capita in response to the news of winning the Olympic bids. Both observations also showed patterns of a slighter increase in growth rate after the actual Olympics – which predicts that the anticipation of hosting the Olympics could have brought up the rates for both variables, but also decrease after the actual event occurs and anticipation dies down. Additionally, the employment rate patterns seem to increase immediately after the news of winning the bids, but also fall at a fast rate a year or two before the Games. This could be an indication that the country is employing a significant number of people in the labor force to prepare for hosting the Olympics, which involves strategic marketing planning, logistics in building infrastructure, and many more. With increase in capital stock during the same time, the overall production level of the country would have increased, thereby increasing GDP. These observations are from two different countries Spain and France, with only three different examples of the winning and hosting of the Games. To further understand the trends of the impact winning the bid has for production levels, we would need to observe the IRFs for all countries that won the bids, in comparison to those that have never won the bid, or even never bid.

## 5 Impacts on the Economy

The purpose of conducting this study was to observe two different aspects of the economic benefits of hosting the Olympics:

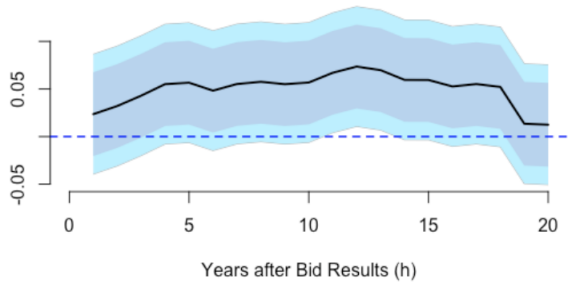
1. Is there an impact of macroeconomic variables merely based on the news of hosting of the Olympics in a certain country?

2. If the question above is true, then how are these variables changing and are they having a positive impact on the economy?

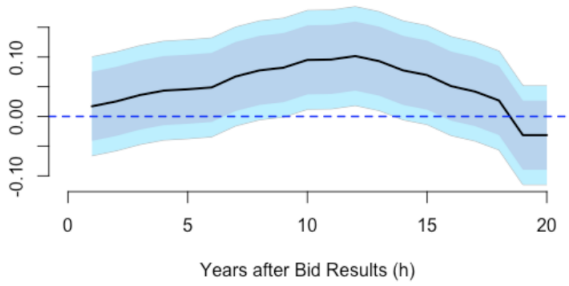
In response to the second question, this paper will delve into two different aspects of macroeconomics: output production and expenditure. In Figures 2 and 3, we observed a possibility for an increased level of output with capital and employment increasing at the same time after the bidding results of the Olympics, resulting in a higher GDP. In order to understand the scope of the kinds of impact the Olympic bids are giving the economy, we further observed how it impacted the level of production.

$$Y = F(K_{it}, L_{it}) \tag{2}$$

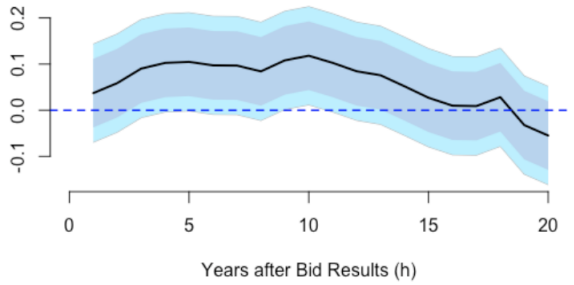
$Y$ indicates the level of output, $K$ and $L$ represent the amount of capital and labor that goes into producing the output. Figure 4 outlines how capital and labor changes with the news shock of winning the bid.



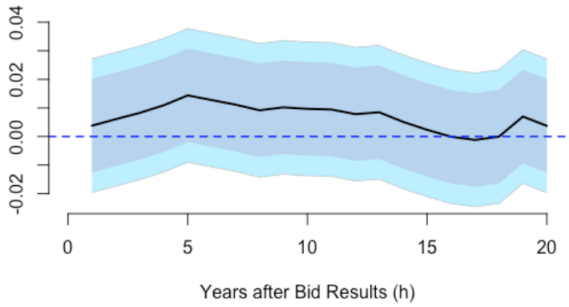

GDP per Capita




Capital Stock per Capita




Investment per Capita




Employment per Capita

Figure 4. Local projections of GDP, Capital Stock, Investment, and Employment per Capita in response to bidding results.

Notes: The black lines that run through the middle are the point estimates and the shaded areas are respectively 90% and 75% confidence intervals. All variables are estimated with logarithmic functions, therefore can be interpreted as elasticities. The lag of all the variables are by 1 horizon (h), year.

Figure 4 contains the IRFs of how macroeconomic variables are impacted through the bidding results over a horizon of 20 years (h = 20). The news shock is calculated based on whether the country wins the bid for the Olympics. We notice an increase in all the variables immediately following the news. These effects also start showing trends of decreasing rates at about $h = 15$. Specifically, in the top left graph of Figure 4, GDP per capita increases by about 5% and steadily increases even after the Olympics until 17% to about $h = 12$. The rates are consistently persistent until $h = 18$. The outcome for capital stock per capita in the top right graph shows an increase to

about 8% consistently until $h$ = 12, and then the rate starts to decrease. The rates decrease to zero by the 18th year. The bottom left graph is investment per capita which surges to 10% by $h$ =3 and peaks at $h$ = 10. There is a dip, but a quick rebound at around $h$ = 7. It declines to zero by $h$ = 15. Employment per capita on the bottom right graph, increases and peaks to about 2% at $h$ = 5. There is a consistent decline in the rate until $h$ =15, when it reaches zero.

The basic hypothesis we can draw from the changes in output is that an increase in GDP is directly impacted by the rise in capital and the increase in investment. Capital stock is continuing to increase at the time of the news of winning the bid, as well as after hosting the Olympics. The rates of GDP and capital stock per capita are consistently increasing at 10% even after $h$ = 7, which indicates the period after the Olympic Games. There is also a minimal increase in the rates of employment following the results of the bid, which soon decrease in rates starting from $h$ =5, and even more so around $h$ = 7.

To put it into perspective, the Olympic Games is an event that requires a significant amount of investment in preparation for hosting the Games in response to winning the bids. Figure 4 shows a significant result of a 10% increase of investment merely by the news of winning the bid. Most likely, the investment ($I$) will be spent on preparing for capital ($K$), such as building of roads, airport systems, telecommunication, transportation, security, and hospitality.

$$K_{i,\,t+1} = (1 - \delta_i)K_{it} + I_{it} \tag{3}$$

Therefore, we expect the Olympics to increase capital stock ($K$) by increasing the amount of investments ($I$). Additionally, there is a possibility that initially, the consistent 5% growth in GDP per capita after the news of winning the bid could be a result of the increase in capital

stock, as well as increase in employment. The consistency of employment after year 5 shows the possibility that the labor force became more effective with increase in capital, therefore having a higher output.

This corresponds with the capital deepening hypothesis which claims an increase in economic growth and higher output as a result of investing in capital to labor ratio. It hypothesizes that the labor force becomes more effective through the overall improvements of capital, the use of tools, equipment, or increase in raw materials, and the improvements of labor efficiency, allowing a higher output per worker. The sharp increase in investment post the bidding results are most likely attributable to producing capital stock. In reflection to this, we can start to presume that an increase in capital stock invested toward the beginning of the Olympic preparation process after the bidding (the equipment or tools used by labor) is what results in an effective labor force. This effectiveness allows the same number of the workforce to be capable of producing more output, thereby increasing the marginal productivity of labor. Thus, it makes sense that the employment rate increases more towards the beginning of the project, since there needs to be a great number of labor force participation in producing the necessary infrastructure for the events. However, it also shows that the rate dwindles over time, and especially after the 7 years mark, after the Olympics end, demonstrating that while there is still an increase in employment, the productivity of each of the labor has ultimately increased. In addition, the increase in capital stock indicates a cost-efficient production for the government and businesses sponsoring the Games. The hypothesis can be assumed by the results of the cobb douglas aggregate production function,

$$Y_{it} = Z_{it} K_{it}^{\alpha} L_{it}^{1-\alpha} \tag{4}$$

in which $K$ stands for the capital, and $L$ represents the labor employed. Therefore, from Figure 4, the increase in GDP was a result of higher levels of output, from the increase in capital impacted through investments.

In Equation (4), total factor productivity (TFP) is represented by $Z_{it}$ and $\alpha$ is the share of labor compensation. This means that any level of output ($Y$), is coming not only from capital and labor, but also potentially the growth in TFP and labor share. Suppose we take the logs of the aggregate production function in equation (4) and divide it by employment ($L$), where

$$y_{it} = log(Y_{it} / E_{it}),\ z_{it} = log\ Z_{it},\ \ k_{it} = log(K_{it} / E_{it}) \tag{5}$$

then,

$$y_{it} = z_{it} + \alpha_{it} k_{it} \tag{6}$$

With the possibility that the increase in GDP is dependent on a factor other than capital deepening ($k_{it}$), the increase in labor productivity ($y_{it}$) should come from growth in total factor production ($z_{it}$) or a decline in labor share ($\alpha_{it}$). Total factor production accounts for the increase in output that cannot be explained by traditional labor and capital. A growth in TFP would also ultimately result in the increase in GDP, but wouldn't account for labor efficiency. Assuming the type of work that goes into preparing for the Olympics, new technology or changes to worker knowledge could help the countries become more efficient in building infrastructure or hosting global events, but these benefits wouldn't be as useful for forthcoming endeavors that the country may use after the Olympics is over. Also, these skill sets and technology are fairly universal, such as building stadiums or making roads, which means that there will likely be no

increase in technology after the news shock. Figure 5 visualizes the outcomes for TFP and labor share.


Figure 5. Local projections of GDP per worker, Capital per worker, Total Factor Productivity, and Labor Share in response to bidding results.

Notes: The black lines that run through the middle are the point estimates and the shaded areas are respectively 90% and 75% confidence intervals. All variables are estimated with logarithmic functions, therefore can be interpreted as elasticities. The lag of all the variables are by 1 horizon (h), year.

The top left graph of Figure 5 demonstrates GDP per worker, which increases about 5% and the growth rate remains consistent until $h$ = 18. On the top right, total factor productivity (TFP) increases around 2% in the beginning, but declines to zero around $h$ = 8. It rises again back to a 2% at $h$ = 10 and remains consistent throughout. Capital per worker, which is on the bottom right

graph of Figure 5, also increases about 5% and remains consistent until $h = 18$, until it plummets. Lastly, the IRF for labor share, on the bottom right graph, starts increasing very minimally to 1% at around $h = 5$, reaches the peak at $h = 10$, and starts declining to reach zero at $h = 17$.

TFP remains fairly consistent throughout the years since the bidding of the Olympics. The share of labor compensation is also fairly consistent, with the peak reaching a 1% growth rate at $h = 10$, but consistently increasing mostly throughout the timespan. The consistency of TFP and labor share growth rates demonstrates that the growth of output is dependent on capital deepening to occur after the bidding of the Olympics. An increase in investment spent on the Olympics since the news of the bidding caused an increase in capital stock – building new roads, facilities, preparing for tools and equipment for the Olympics, which leads to an increase in capital stock available in the country. With this, the marginal productivity of labor was able to increase, and more output was made through a consistency in the labor force. On the other hand, TFP barely portrays changes, which corresponds with our prediction above that an improvement in technology or changes in worker knowledge would not be necessary in hosting the Olympics. Ultimately, the current observations illustrate that capital deepening provides a sufficient explanation to explain the rise in output per worker, and therefore, the increase in GDP in response to the bidding of the Olympics. While this is not an indicator of whether the Olympics are an economically beneficial event, we can offer evidence that the IRFs of winning the bids for the Games overall show a positive trend in GDP.

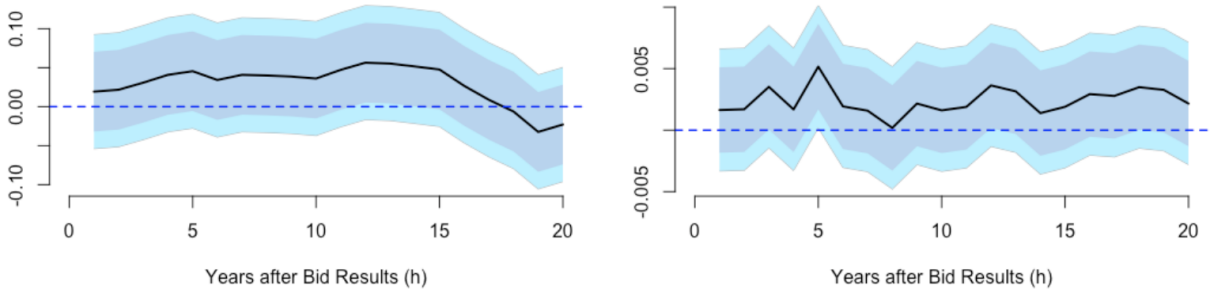
The previous impulse response functions indicate that there had been a higher level of output production due to capital deepening, and less impacted by total factor production and labor share.

If GDP increased due to capital deepening, we need to understand what made this increase in investment and government spending towards capital possible during the period of preparation for the Olympics. In addition, it is also imperative to understand that a sudden surge in spending and investment could hurt the economy.

Crowding-out effect is a theory explaining how an increase in government spending reduces the spending of private sectors (Robinhood, 2021). Government spending can be increased by two different methods: (1) increase taxes, and (2) borrow money. When increasing taxes, consumption decreases because household consumers and companies end up spending less money (less circulation in the economy). When the government decides to borrow money, it involves the process of selling bonds. With more bonds available for companies and individuals to invest in, it means that a large amount of cash is tied up and leads to less circulation. Often, governments also increase the interest rates of the bonds for more people to buy it, causing a general increase in interest rates in the country. In other words, increasing government spending overall increases money demand, and which, in turn increases the equilibrium interest rate.

Whether it is by increasing social welfare, bringing government stimulus, or creating infrastructure, there are several reasons for why government spending could increase in a country for a certain period of time. The Olympic Games is considered an investment in infrastructure. As mentioned before, hosting the Olympics involves processes such as building stadiums, roads, improving airports, and more. It is a process of governments having to reallocate their budget for spending the next couple of years on preparing for the Olympics. The budget will either be created through an increase in taxes or selling more bonds. If this theory is true, it is very

possible that a crowding out effect could happen in countries that decide to invest for the Olympics. Therefore, crowding out could be suspected if there are increases in interest rates following the Olympic bid - winning results.




Government Consumption Interest Rate

Figure 6. Local projections of Government Consumption and Interest Rate in shares of GDP in response to bidding results.

Notes: The black lines that run through the middle are the point estimates and the shaded areas are respectively 90% and 75% confidence intervals. The lag of all the variables are by 1 horizon (h), year. The left graph is government consumption represented with a logarithmic function and the graph on the right is a representation of interest rates in shares of GDP.

The graph on the right of Figure 6 outlines the change in interest rate after the response to winning the bidding results. The results are not significant and increase at a rate about .5% throughout $h = 20$. Government consumption increases to more than 5% change within the first $h = 10$, which represents an increase in government spending throughout the news shock of winning the bid, the process of preparing for the Olympics, and even after the Olympics have been hosted. With a significant increase in financial expenditures that are spent for the Olympics, there is a high chance for the countries to borrow money or increase taxes, leading to crowding out effects. The graph of government consumption in Figure 6 outlines that in the 12th year of the bidding events, there is a short dwindling effect, and a sudden reduction post the 18 to 19

horizon. This could be due to the drawbacks of being in debt after borrowing money for the Games.

While we can see a slight increase in interest rates following the news shock in the graph on the right of Figure 6, the changes seemed rather steady and not much of an impact. From this, we can denote that crowding out is not occurring as a response to preparing for the Olympics. This result is likely to happen because countries start to prepare intensely for the Olympics before the bidding stages. Due to this, there is a high possibility that there wouldn't be a sudden unexpected increase in government spending, that would cause the government to look for ways to increase interest rates or increase taxes. Instead, countries would already have a plan to reallocate their government spending in ways that would efficiently reduce the costs in other spendings. According to the Organizing Committee for the Olympic Games (OCOG), the budgeting processes have been changing over time as well as depending on each of the host cities. The main variables that are under the supervision of local authorities include capital investment budget (competition and non-competition venues), operations (security, transport, medical services, customs), general investments (roads, airports, railways). Starting from before the bidding process, countries spend a significant amount of time analyzing the amount of money that would be spent on hosting the Olympics in their respective cities. From the venue and facilities, each representative of the countries create a financial plan that would indicate a detailed budget of how they would allocate their money and where they would receive the money. Thus, while it is inevitable that a large sum of investment is necessary immediately following and possibly prior to the bidding news, it won't be a surprise for the government to have to get a hold of that money that could potentially risk a fall in GDP.

In order to understand expenditure, let's take a look back at our previous graphs in Figures 4 and 6. There is an increase in both consumption and investment as a result of winning the Olympic bids. A higher percentage of investment towards the beginning can be observed, and it decreases sharply over time, then investment surges again in years 7 to 10. Because the Games are hosted 6 to 7 years after the bidding results, this shows how there is a significant amount of investment starting from the years following the bidding results, but most importantly, and a surge after the actual games. By looking at the changes in interest rates in Figure 6, it can be assumed that the crowding out effect is not occurring as a response to increase in consumption. Then, where is all this money coming from? To further investigate this, we look at what consists of GDP.

$$Y_{it} = C_{it} + I_{it} + G_{it} + X_{it} - M_{it} \tag{7}$$

The equation above portrays household consumption($C_{it}$), investment ($I_{it}$), and government spending ($G_{it}$). By looking at the net exports ($X_{it} - M_{it}$), we can assume if the GDP ($Y_{it}$) is dependent on the resources coming from abroad. If we adjust the equation to understand investment as a share of GDP,

$$\frac{I_{it}}{Y_{it}} = 1 - \frac{C_{it} + G_{it}}{Y_{it}} + \frac{M_{it}}{Y_{it}} - \frac{X_{it}}{Y_{it}} \tag{8}$$

Investment, in this case, would be a result of new output, reduced consumption (both household and government), or change in net exports.

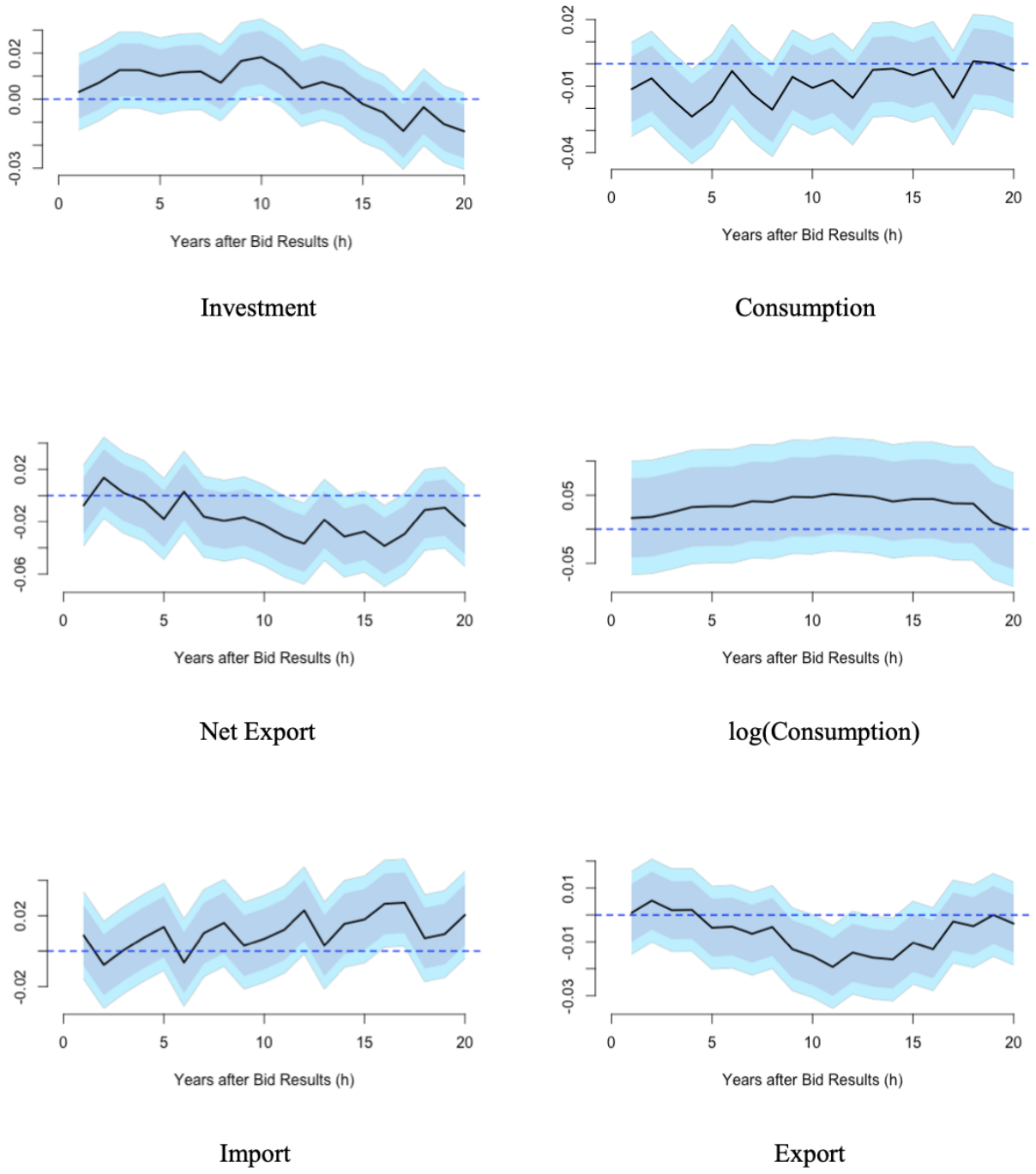



Figure 7. Local projections of Investment, Consumption, Net Exports, Imports, Exports in shares of GDP, and real consumption estimated with logarithmic function in response to bidding results.

Notes: The black lines that run through the middle are the point estimates and the shaded areas are respectively 90% and 75% confidence intervals. The middle right graph of consumption is estimated with logarithmic functions, therefore can be interpreted as elasticities. All other graphs are estimated in shares of GDP. The lag of all the variables are by 1 horizon (h), year.

To the top left graph of Figure 7, investment, represented in share of GDP, increases more than 2%, peaking earlier on around $h = 10$, and shows a sharp decline around $h = 12$. Top right graph portrays the share of household and government consumption in GDP. While the consumption is decreasing with respect to GDP, the rate is persistent throughout the 20 years. The bottom two graphs in Figure 7 are representations of imports and exports in shares of GDP with lag-1 difference. Imports remain consistent, with a little bit of fluctuation on a positive trend. Exports also remain consistent, but a small decline can be observed. Net exports, presented in the middle left graph of Figure 7, are also falling post the announcement of the Olympics and onward. Last but not least, the middle right graph is the real consumption of both household and government, estimated using logarithms. There is a positive increase until $h = 18$ at about 5% growth rate. The reason for adding two different types of graphs of consumption in Figure 7 was to first portray an overall increasing trend of the growth in consumption after the news shock. Secondly, it was to show consumption with respect to different factors of GDP, such as investment and net exports.

Therefore, while consumption of national accounting does become progressively greater in response to winning the bids for the Olympics, it also decreases in ratio in comparison to investment used during the time. This is most likely because government spending is considered to be costs used for immediate effects of changes in GDP, whereas investment focuses on the long-term changes, such as spending on infrastructure – which is a lot more likely to be used during the time of preparing for the Olympics.

Net exports are also decreasing a couple of years after winning the bid for the Olympics. This could mean that initially, there could be regular patterns of exports and imports coming in and

out of the country, but with the news of hosting the Olympics, countries could start to raise their level of imports. The decrease in net exports also provides implications that countries that win the bids are earning money for investment by borrowing resources from other countries. Therefore, as net exports decrease, investments rise, providing more money to be spent on hosting the Olympics.

# 6 Conclusion: Limitations and Future Research

An accurate comprehensiveness of the impacts that the Olympics give the country is more than necessary, due to the waning popularity of the Olympic Games. While the effects of winning the bid could be less visible than the impact of the Games itself, the paper outlines a positive impact just from the news shock. That being said, it is imperative to be cautious of whether this has long-term positive impacts, and understand that the results doesn't necessarily account for whether hosting the Olympics is beneficial as a whole, because there are so many other confounding various and extraneous factors to consider. The research employed a specific type of impulse response function called Local Projection method, in order to show predictors of such macroeconomic variables in response to winning the bid for the Olympic Games. To summarize, this paper provides support that there is an increase in investment after the bidding results, which caused a positive impact on labor and capital, ultimately, raising the productivity of labor in the long run.

The data utilized in this study includes 183 countries from 1950 to 2019. The biggest limitation and idea for future research would be to see the impact that bidding would have on specific

cities, instead of countries. First of all, using the countries decreased the sample size significantly, because throughout the span of the 70 years, the same 18 countries won the bid. By incorporating the data based on the cities would allow for a greater sample size. In addition, observing the impact of macroeconomic variables based on countries is quite vague, especially for countries as big as the United States or China.

Additionally, after a couple of decades, and more countries bid for the forthcoming Olympic Games, it would be crucial to research the impact that the 2019 bidding process change by the IOC has on the economy. This new change in process states there to be less investment in facilities, and utilize already existing or build temporary stadiums. With these adjustments, we can predict there to be less amount of cost incurred. While there are not a lot of resources available currently for the public as of how this is impacting the bidding process, based on the IOC's motive for reducing the costs of the Olympics, we could predict that there would be a shift in what we can now observe. Along with this, due to the shift in media attention in the last decade, it would also be interesting to see how these trends contribute to the long term impacts of hosting the Olympics.

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