

GOING FOR GOLD: THE IMPACT HOSTING THE OLYMPICS HAS ON
NATIONAL EMPLOYMENT RATES

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Abstract

The worldwide excitement generated by the Olympic Games needs to be examined in terms of economic impact. The Olympic Games is defined in economic terms by the Pre Olympic Period, the Olympic Year, and the Olympic Legacy Period. The purpose of this study is to determine the effects of hosting the Olympics on a nation's employment rates. The hypothesis is that hosting the Olympics improves employment in the Pre Olympic Period and Olympic Year Period but likely has minimal effect during the Olympic Legacy Period. Contrary to the hypothesis the results suggest that hosting the Olympics has no significant effect on employment as a percentage of the population in an Olympic host nation. However, the trend in all three Olympic Periods was favorable for improved national employment.

KEYWORDS: (Olympics, employment)

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CHAPTER 1

INTRODUCTION

When considering hosting the Olympics all countries need to know whether it is beneficial to host the Olympic Games. By examining the employment of a host nation over an eighteen-year period following the Olympic Games, this important question may be answered. Using Ordinary Least Squares Regression analysis to study data about the Olympic host nation, it is possible to make an assessment on the economic viability of hosting the Olympic Games.

Economic success and failure is critical to the host country of the Olympics during these financially challenging times. For example, the Los Angeles Games of 1984 are widely accepted as a successful financial endeavor with some of its venues still in operation today. However, the Montreal Olympics of 1976 were a financial catastrophe for the country of Canada and the province of Quebec. It took thirty-two years to finally pay off the debt incurred from those Olympics. (Preuss 2004) These two extremes show the importance of economic viability, not only in the short term but also in the long term for citizens throughout these host countries.

Vast amounts of money are spent on hosting the Olympics and the amount seems to increase every time they are held. The benefits to the host city are uncertain, economically speaking. To get a good idea of how much hosting the Olympic Games actually cost the Olympic process must be viewed as a whole. According to Preuss

(2004), the bidding process starts about eleven years before the Games take place. This is when the idea is floated around to see if a city would like to host the Games and if it is economically feasible for the city. Preuss outlines the Olympic period by saying:

The 'International Olympic Committee (IOC) bid' phase is split in two stages and takes nearly two years. The first year is called 'applicant stage' which is used by the IOC to evaluate the physical infrastructure of the cities. The second year is called 'candidature stage' and is a rather political phase which ends with a secret ballot of the Olympic city by all IOC members but not those that have the nationality of the bid city. The seven years of preparation for the Games are important, especially if there is a lot of permanent construction planned. The economic legacy comprises all economic effects that are related to the Olympic Games after the closing ceremonies. (Preuss, 37)

Preuss believes the Olympic Legacy period should be measured for the ten years following the Games. According to Maennig and Zimbalist (2012) the first phase of bidding costs US\$150,000 and the second phase of bidding costs US\$500,000. Using Preuss' model, "The Organizing Committee of the Olympic Games (OCOG) objectives are to at least cover the required expenditures to host the Games with adequate revenues or, if possible, to achieve a surplus."(Preuss, 95)

Revenues

The major revenues that come from hosting the Olympics come from television rights, ticket sales, and marketing. Olympic host cities look to maximize their revenues by including lotteries, interest rates, rental fees for the Olympic village, hosting test events, and donations. National Lotteries are used by countries to raise revenues during the vital venue building time period. Interest rates on bonds for the Olympics are also used to raise revenues during the building phase. By artificially setting the interest rates low the OCOG utilizes this instrument to increase capital needed for the Games. Hosting

test events in the time period prior to the Olympics not only raises revenue it streamlines the events for the Olympic Games. If all of these revenue sources offset expenditures of the Olympics then the Olympics will be considered a financial success.

The host city makes the majority of its revenues by selling the broadcasting rights of the Games to other countries. Preuss writes, “Since Los Angeles 1984, selling television rights has become one of the major financing sources for the OCOGs and the Olympic Movement. Caused by the multiplier effect of the media, marketing has developed at a correspondingly later date into the second column of Olympic revenues.” (Preuss, 99) The OCOG must use this to its benefit and try to maximize its profit because it is such a huge portion of its revenues, which are shared with the IOC. The share of the IOC’s revenue from broadcasting rights has been increasing since they were first sold for the 1960 Olympics in Rome. The IOC’s share has increased from 4.40 per cent to 51 per cent for the 2008 Games in Beijing. According to Preuss, this makes the IOC the leading negotiator for Olympic Broadcasting Rights. According to Maennig and Zimbalist, “An estimated 4.7 billion viewers – or 70 percent of the world’s population- tuned in to watch the watch the 2008 Beijing Olympic Games, an increase of 21 percent over the 2004 Athens Olympic Games with a 3.9 billion audience, and 31 percent over the 3.6 billion who tuned in to the Sydney Games in 2000.” (Maennig and Zimbalist, 10)

Sponsorships also help insure that the Games take place. There are two main types of sponsors for the Olympic Games. The major sponsors are known as The Olympic Program (TOP) sponsors. According to Preuss, “TOP sponsors provide funding to all the 201 National Olympic Committees (NOC), provide technology and resources to OCOG for Games operations, enjoy an unprecedented renewal rate within industry and

provide a global promotional platform for the Olympic brand across 220 counties.”(Preuss, 122) This means that TOP sponsors can use the Olympic symbol on their products in exchange for revenue to the NOC and the OCOG. They pay more than the average sponsor. The other type of sponsor for the Olympic Games is national sponsors. Preuss wrote, “In the host country, they are subordinate to TOP sponsors and partners. In countries which do not host the Games, the sponsor of the NOCs is subordinate to only TOP sponsors.” (Preuss, 123) The combinations of both of these types of sponsorships make up a large source of revenue for the host city.

“Historically, the sales of tickets have contributed to the financing of the Olympic Games since Athens 1896.” (Preuss, 67) Ticket sales have declined with the evolution of television and mass media broadcasting the Games to the world. Preuss continues, “Although ticketing sales has declined in significance, it is still in third place after the revenues from marketing and the sales of television rights.” (Preuss, 167) Ticket sales should be looked at on a broader scale than the number of spectators in attendance. The host city builds massive stadiums to accommodate the Olympics and it hopes to see the seats filled for all events. The down side of tickets is that media, sponsors and the Olympic family get to attend the Games for free. This puts pressure on setting the right prices for the events. The host city wants to maximize its profit and the best way to do so would be to sell the most tickets at the highest price.

Strong Olympic Coin and Stamps programs can be a huge source of revenue for a host city as well. “They must be distinguished strictly from commemorative medals that are mined under license, and must look like the Olympic medals awarded to the athletes. Olympic coins are legal tender and issued by the mint of the respective country.” (Preuss,

132) Looking at the revenues from previous Games Olympic coins and stamps provided a large revenue source until approximately 1960 for the host city but the recent trend is that the coins actually run a deficit for the host county. The ways to make money off of minting Olympic coins are from surcharge and seignorage or a mixture of the two, according to Preuss (2004). The ways to make money off of Olympic Stamps are surcharges on the face value, supplementary charges on the face value, or sharing part of the face value. (Preuss 2004)

Olympic lotteries have been a long-standing source of Olympic revenue. “Lottery bonds are ‘bonds not earning any interest or earning low interest and instead of or in addition to low interest lottery premiums are paid. The bond amount is paid back in full.’” (Preuss, 183) These lotteries can be systems already in place or implemented just to help support hosting the Olympic Games.

With the vast revenues sources delineated above, employment should improve in the host nation. These Olympic revenue programs provide more employment opportunities for the citizens of Olympic host nations. Olympic coin and stamps programs, lottery bonds, ticket sales, and venue sponsorship development all require vast human resources in the hopes of ultimately generating tourists

Tourism

Tourism seems to be the biggest boost to the economy for a host city. These tourists flood the economy with new money. This new money will be spent on food, apparel, lodging, and transportation. It will help pay for new jobs that will be needed to accommodate such a high demand. These tourism dollars create the multiplier effect to hosting the Olympics.

Pre-Olympic tourism is the tourism to a host city in the seven-year build up to the Olympics. Preuss best express this when describing the Athens Games in 2004 and the 1924 Winter Olympics in Chamonix:

The high television rates for the next Games will transport the image of Athens, Attica and Greece to the world. For Attica, the region around Athens, the arrivals decreased from 2.1 million in 1980 to 1.5 million in 1991 and rising 1.9 million in 1997. A new and positive image could help to increase tourism in Attica after the Games. The positive impact of the Olympic Games on tourism is, 'often the first reason highlighted by the candidature committees for the Winter Games ... The publicity campaign for the first Winter Games in Chamonix 1924 was carried out ... to increase the number of visitors to this resort. (Preuss, 47)

This increase in pre-Olympic tourism in Athens was an economically beneficial after the announcement that Athens would be hosting the Games.

However, tourism during the Olympics is not as high as most people would expect. "The true number of foreign visitors to the Olympic Games is probably only between 400,000 and 800,000, and the number strongly depends of the geographic location of the host country." (Preuss, 51) The higher the number of people that visit during the Olympic year the larger the boost to the economy because not only are these tourists spending money in the host city they are also spending money to attend the Games.

The post-Olympic tourism has the biggest economic impact on a host city. The better job the host city does of projecting its image to the world, the higher the likelihood of an increase in future tourism. Preuss writes, "The Olympic tourism legacy is largely positive because the media coverage increases the desire of potential tourists to visit the country after the Games due to a change in the perception." (Preuss, 59) This is one of the main reasons to host the Olympic Games.

Clearly tourism can lead to long term employment. If the host nation has a successful Olympics and attracts worldwide attention as an appealing travel destination then long-term unemployment should decrease. If budgetary control has been properly implemented there is hope for long-term economic success and improved employment.

Expenditures

The largest expenditures of hosting the Olympics are building the structures needed to put the games on and the opening and closing ceremonies. The types of structures come with much debate because the temporary structures are more profit maximizing and the permanent structures could remain dormant with maintenance fees. The opening and closing ceremonies should be some of the highest expenditures for a host city because they are the chance for the host city and nation to share their culture with the rest of the world. Good opening and closing ceremonies could help the image of the host nation and attract more people to visit the country. Other expenditures include the equipment, the ceremonies, and the personnel for athletic events, cultural events, and upgrades to the city to make it accessible to the world. According to Preuss,

The costs for the organization and staffing of the competition sector vary from country to country depending upon the wage levels and the willingness of the population to work as volunteers. With the increase in the number of competitions, disciplines and sports, the Games programme has inevitably become more complex. This, in turn, has resulted in the need for a more comprehensive organization. For this reason alone, the costs of staging the competition have risen. (Preuss, 200)

In order to ensure that the individual events during the Games are held as planned the host city must make sure the equipment works and is modern. This includes all of the timing and scoreboard technologies. As the Olympics themselves continue to evolve, the

costs continue to rise and the equipment requirement to put on sporting events is more expensive. Victory celebrations for the athletes are another expenditure that the host city must take into account. The host city needs to provide athletes with medals for winning their competition, as well a platform for them to stand on during the medal presentations. These celebrations include the national anthems and songs for the winners of each event. Current technology keeps the Games running well. Without the most up-to-date technologies the Games could simply not function. Preuss writes,

Without using up-to-date technology, it would be impossible to organize the Olympic Games of today. Modern technology is used in communications in order to transmit data, live pictures and sound signals, phone calls, and in the information management system used by the Olympics organizers and media commentators. In addition, it is also used in security, results collection and transmission, accreditation, logistics and the medical service sectors of the Games. (Preuss, 216)

The benefit to incorporating the newest technology is that industries may consider relocating to the host city.

Test events are the best way for a host city to determine its readiness to host the Olympics. With more sports included in the Olympics, more test events are necessary. These events provide little revenue for the host city but play a vital role in the preparation of the Olympics. For example, the test event for beach volleyball was done several months before the Olympics in London and provided little revenue for London but allowed the Olympic committee to optimize the sand to make the beach volleyball venue of the highest caliber.

The opening and closing ceremonies provide the biggest opportunity for a host city to capture the attention of the world. These ceremonies are used to help spread the

culture of an Olympic host. If the image of the host city is improved through the opening and closing ceremonies it will lead to an increase in future tourism.

A cost-increasing factor would be an increasing number of obligatory elements. In this respect, it is interesting to note that 63 per cent of the German Olympic tourists who were asked about the opening ceremony of Barcelona 1992 mentioned a protocol element as being the most impressive part of the entire opening ceremony. (Preuss, 204)

The prices of these ceremonies are usually increasing each time the Olympics are held because the host country wants to make sure that it does the best job with the majority of the world watching.

With the world's premier athletes and respected dignitaries from around the world attending the Games, security must be a priority for the host city. Not only could an attack on a host city potentially harm its image it could also hurt future tourism for the country. "A survey of 620 senior managers from 13 nations after the Atlanta 1996 bombing showed 'that the bombing, in retrospect was not viewed as a major negative for the Games, albeit it certainly grabbed attention.'" (Preuss, 221-222) With terrorism prevalent in society today, security during the Games must be taken very seriously.

Building stadiums and the village is one of the biggest expenditures for a host city. Host cities build massive stadiums in order to accommodate the IOC's requirements. These stadiums are often under-utilized post-Olympics. "The primary structure is often built only for the Olympics. Therefore it is important to plan the post-Olympic utilization." (Preuss, 71) Host cities must build housing for the athletes during their stay in the Olympic host city. These villages must be accommodating for all types of athletes. Host cities must also improve their transportation sectors of the city. This means that

they will build or improve their international airport terminals. This also requires upgrades in the train and or bus stations. These upgrades will be good for the city in the long run.

The personnel on the administration side of the OCOG must be paid for their work. They make sure that every aspect of the Games goes according to plan. “An OCOG has a very short life cycle and can therefore offer jobs for only a limited period of time. Motivating the employees of an OCOG via payment of special wages or by offering other incentives is therefore especially important in order to attract committed and experienced staff.” (Preuss, 230) These are expenditures that must be taken into account when considering hosting future Games.

Although the Olympics require enormous expenditures during the Pre Olympic Period if properly budgeted the economics and employment could improve for the host nation. The trend in the modern Olympics is to use multipurpose structures that can be used in the future. For example, Olympic stadiums have been used as soccer, track and field, and concert venues in the Olympic Legacy Period. The use of these multipurpose facilities can translate to employment opportunities following the Olympic Games.

Funding

How are the games funded? Public funding proves to work in some Olympics but created a catastrophic debt in some Olympic cities, such as Montreal in 1976. Private funding comes with a big question mark because the cities do not know if they will receive enough money to put into the games, but if done correctly it could help the host city receive maximum profit. The optimum combination is private and public funding with a partnership that leads to less risk and more reward for the host city.

Public funding was used as the primary source of funding to host the Olympics in the earlier years. The 1976 Olympics in Montreal were a massive disaster for the city.

According to Preuss,

At the conclusion of the Games the private revenues generated by the OCOG amounted to a mere 5 per cent of the funds required. The remaining 95 per cent was provided by special financing means and by the public sector. When including the interest paid on the debt over the years and the addition \$537 million in 2000 US dollars required to completing the facilities after the Games, the Olympics debt totaled \$2,729 million in 2000 US dollars. Municipal and provincial tax dollars eased the burden of the debt, with final payment scheduled for the 2005/06 financial years by a special tobacco tax. (Preuss, 15)

The result of the debt incurred by the Montreal Games resulted in a shift in funding by future cities to strictly private funding.

Private funding is how the Games are run today in the West. Since the success of the 1984 Los Angeles Games, the private funding model stuck. It ensures that the host country will not incur the debt brought on by hosting the Games. Comparing and contrasting the Los Angeles Games of 1984 and the Montreal Games in 1976 shows a stark contrast between private and public funding of the Games and an equal contrast in revenues and debts.

Although the Olympics outwardly appear to be similar to the public year after year, there are large differences when analyzing these Games through economic instruments. The expenditures, although always increasing, are financed in markedly different ways with public and private funding tools such as lotteries, bond interest rates, stamps and coins, rent fees for the Olympic Village, hosting test events, and donations. In public funding the risk is taken by the citizens of the host country especially in areas near the Olympic host city whereas in private funding stricter fiscal discipline show to be

more financially rewarding to the citizens of the host country. Expenditures increase for host countries due to the cost of building structures, venues, equipment, opening and closing ceremonies, personnel, housing, and upgrades to the city. Revenues transition from in-person spectators and tourists driven demand and migrated to television revenues from advertisements and broadcast rights. Tourism still remains key revenue to the host country due to its immediate and multiplier monetary effects. Current trends, which seem to be driven by economics, have lead most OCOG to use private funding tools to finance their Games. Funding instruments, whether private or public, have little impact on unemployment but may lead to a mild increase in employment due to the multiplier monetary effects.

Employment

Employment during the Olympic Games is one the most beneficial impacts due to the Olympic host city. Hosting the Olympics provides a huge boost in employment for the Olympic host city and hopefully in turn the host nation. Employment opportunities from hosting the Olympics can be short-term or development of existing industries that have been improved. Preuss wrote, “The overall economic effect the Olympic Games have on a host city can be expressed not only by the increased income but also by the employment generated by the Olympics.” (Preuss, 247) To ensure lasting effects on employment the Olympic host city must develop industries that can sustain lasting growth.

Short-term Olympic employment poses an interesting argument for Olympic host countries. The short-term Olympic employment can provide jobs to the unemployed but for a fixed date in a small area. The majority of these short-term jobs are provided by the

Olympic Committee Organizing the Games (OCOG) and last from the lead up to the host city being selected until the Games take place. According to Preuss, "the average employment duration at the OCOG may be approximately four years. " (Preuss, 253) Other Olympic employment opportunities include, security, construction and trade. (Preuss, 253) These relatively short-term employment offers can be a down side to Olympic employment because these jobs are not permanent and can create more unemployment than if the Olympics were not held at all. According to Preuss:

Ultimately, the question remains how far the person can enhance the benefit level in the case of short-term employment. Irrespective of the duration of a job, it has been clearly show that additional work will finally lead to the employment of an unemployed person or save an employee from becoming unemployed. In addition, those finding a job will improve their prosperity level. This consideration, however, is only true if compared with the 'case without Olympics' because other project might create more jobs.

(Preuss, 248-249)

A goal for any city looking to host the Olympics is develop lasting employment opportunities for its residents.

Long-term Olympic employment can provide sustainable growth for the Olympic host nation's economy. "In sectors, which expand through the Olympic Games such as the building sector and the tourism and leisure industry, lasting jobs are created." (Preuss, 253) Long-term sustainability in these industries can drastically improve the host nation's economy long past the Olympic Legacy period. If the Olympic host city excels showing the culture of the city and nation during the Olympics, future tourism will be increased creating lasting growth in employment in the tourism industry. Long-term Olympic employment can be one of the true judges of the impact hosting the Olympics

have on a country. Brunet describes the Olympic employment impact best when talking about the Summer Olympics in Barcelona in 1992:

After the Games, unemployment in Barcelona rose by 21,000 persons, a figure approximately equivalent to the annual employment provided by COOB'92. Over the following years, unemployment fell significantly. The investment generated by the Games provided a soft mattress, breaking the fall in a context of general depression. Barcelona's economy proved resistant to the widespread recession and, after 1994, once again began to create employment. Until 1993, 41,450 new jobs had been created, representing a halving of the unemployment figures. In 1993 and 1994, the numbers in unemployment increased by 18,000 persons; however, after 1995 unemployment was to fall, thank, in part, to some 20,230 permanent jobs deriving from Olympic investment. (Brunet, 9)

This chapter was an introduction examining Revenues, Tourism, Expenditures, Funding, and Employment in an attempt to understand the depth of economic analysis required to study an Olympic Games. Economic indicators for hosting the Olympics require data analysis for revenues, expenditures, tourism, funding, and employment. Statistical analysis requires reliable data collection. This study will focus on employment in a host country over the three Olympic Periods to determine the impact of hosting the Olympics. Revenues, Tourism, Expenditure, and Funding all can be used to examine and possibly improve employment in an Olympic host nation. The following chapter elucidates the theory used to explain employment rates when hosting the Olympics.

CHAPTER 2

THEORY

This chapter will provide the theory that will attempt to explain the effect hosting the Olympics has on a nation's employment rates. By using the Ordinary Least Squares Regression model this equation will show the effects and the magnitude of the effects on national employment levels during the Olympic periods. This model will expand upon Tucker's model. Tucker's equation that attempted to explain employment in a host city is:

$$Dev_{EMP} = \beta_0 + \sum_i \beta_i D_{MSAi} + \sum_{j=2}^4 \beta_j D_{Qj} + \beta_1 \log(y) + \beta_2 PPP + \sum_k \beta_k D_{Ak} + \beta_3 \log(y) D_A + \beta_4 COST^* D_A + \beta_5 D_{Riot} + e_1 \quad (2.1)$$

where DEV_{EMP} is deviation of actual MSA employment from expect MSA employment level,

D_{MSAi} is fixed effect of membership in i^{th} MSA (Los Angeles is excluded),

D_{Qj} is seasonal adjustment dummies (Quarter 1 excluded),

$\log(y)$ is Log of GDP per capita,

PPP is purchasing power parity multiplier against actual exchange rates,

D_{Ak} is time-period dummy for period k in period of Olympic effect A,

$\log(y) D_A$ is effect of Log GDP/capita on employment in period of Olympic effect A,

$COST^* D_A$ is effect of indexed total expenditures of Organizing Committees on employment in period A. (Percentage of L.A. expenditures -1),

D_{Riot} is dummy for period of effect from 1992 Los Angeles riots,

e is the error term.

(Tucker, 26)

Tucker's model calls for employment data for cities that hosts the Olympics by obtaining Metropolitan Statistical Area (MSA) that was obtained from national statistical agencies. Tucker uses the logarithm of GDP per capita to help put cities on a scale that can be comparative. Using simple GDP per capita has the potential to show that smaller cities will experience a larger growth in GDP per capita and larger cities would show a smaller growth. Tucker attempts to explain catastrophes and their effect on employment on the city level by including the variable for the Los Angeles riots. The model uses the Purchasing Power Parity multiplier to show the price levels in a host nation. Tucker uses the cost variable to determine whether the increased spending during the Olympics has any effect on employment. Tucker looked at the Summer Olympics from 1984 to 2004 and examined employment in each of the cities by quarters for six years before the Olympics were hosted up to eight years after the games took place. (Tucker 2006) The model in this paper expands upon Tucker's model. The equation for the model in this study is:

$$\begin{aligned}
 \text{Employment} = & \beta_0 \text{ constant} + \beta_1 \text{ year} + \beta_2 \text{ Japan} + \beta_3 \text{ Austria} + \beta_4 \text{ France} + \beta_5 \\
 & \text{Canada} + \beta_6 \text{ United States} + \beta_7 \text{ Republic of Korea} + \beta_8 \text{ Spain} + \beta_9 \text{ Norway} + \beta_{10} \text{ Australia} \\
 & + \beta_{11} \text{ Italy} + \beta_{12} \text{ summer} + \beta_{13} \text{ Pre} + \beta_{14} \text{ Olympic} + \beta_{15} \text{ Legacy} + \beta_{16} \log \text{GDP} + \beta_{17} \text{ Birth} \\
 & \text{Rate} + \beta_{18} \text{ Death Rate} + \beta_{19} \text{ CPI} + \beta_{20} \text{ Schooling} + e
 \end{aligned}
 \tag{2.2}$$

where employment is measured as a percentage of the country's population,
Summer is the dummy variable for the type of Olympics,
Pre is the dummy variable for the Pre Olympic Period,
Olympic is the dummy variable for the year the Olympics were held,
Legacy is the dummy variable for the ten-year period following the Olympics,
logGDP is the log of Real GDP per Capita in the host nation,
Birth rate is crude birth rate per 1000 people,
Death rate is crude death rate per 1000 people,
CPI is for Consumer Price Index in the host nation,
Schooling is the average number of years of education completed by people
over the age of 15,
e is the error term.

Equation 2.2 expands upon Tucker's model by adding variables and looking at countries employment data for longer periods of time. The most obvious change to Tucker's model is the use of host nations instead of Olympic host cities. The decision to use Olympic host countries allows the model to include more Olympic Games due to the availability of national data reaching to 1960. It also provides a look at how hosting the Olympics effects employment on the national level. This study looks at both the Summer and Winter Olympics again to provide more data to help strengthen the model. The Birth Rate, Death Rate, and average number of years of education completed by people over the age of 15 variables will better explain employment as a percentage of the population in a host nation more thoroughly. Modifying Tucker's model required the use of Consumer Price Index instead of Purchasing Power Parity. According to Stephan D. Williamson, "CPI is a fixed-weight price index, which takes the quantities in some base year as being the typical goods bought by the average consumer during that base year, and then uses those quantities as weights to calculate the index in each year." (Williamson, 52) This provides the model with a price level for each country in each

specific year. The Consumer Price Index data reaches back to 1960 and does not for the Purchasing Power Parity. The cost variable was excluded in order to examine more Olympic Games. This study uses Preuss' idea of monitoring the Olympics in three Olympic periods, the Pre Olympic, Olympic Year, and Olympic Legacy periods. (Preuss 2004) The expansion of Tucker's model will provide a more in-depth look at employment as a percentage of the population in Olympic host nations.

To measure the impact of hosting the Olympics, data must be taken on a yearly basis starting with the seven years before the Games take place when the host city is announced. The Ordinary Least Squares Regression method begins here and will extend ten years following the Games. This will give the true economic impact of hosting the Olympics including the Olympic Legacy period, which is the ten following the Games. "The size of the annual impacts differ from city to city depending not only on the strength of the economy, but also the capacity of tourist accommodation and existing infrastructure. However, the peak at Game time is most likely to be very strong, but single." (Preuss, 38) To clarify, Preuss suggests that the greatest impact of the Games is during the year the Games are held.

Ordinary Least Squares Regression

The Ordinary Least Squares Regression model is a linear regression that attempts to explain the data. With the multiple independent variables, multiple regression analysis will be used. Steven Greenlaw describes multiple regression analysis by saying, "A statistical method estimating hypothesized relationships while controlling for the effects of confound variables. Regression is a technique for estimating the independent influences of each explanatory variable, and thus statistically maintaining ceteris

paribus.” (Greenlaw, 268) With empirical data it is possible to run an OLS regression. The Olympic OLS regression will help test the null hypothesis that employment in an Olympic host country increases due to the Olympics. The OLS regression will attempt to provide a trend for the direction that employment takes during the three Olympics stages.

The OLS regression model will make it possible to compare individual Olympic Games against each other. The ability to do this can be a tool to monitor the actual impact hosting the Olympics has on a host countries employment. Lee Tucker ran a regression for employment in Summer Olympic host cities starting in 1984 through 2004. (Tucker, 3) Tucker’s model equation uses the variables of the log of GDP per capita and the Purchasing Power Parity. Tucker explains his reasoning for using PPP when saying, “Since these multipliers represent the conversion to actual exchange rates of local currency units, on which the GP numbers in my model are base, they represent the best possible way to compare price levels.” (Tucker, 19) This provides the basis for the regressions ran to determine if employment rises on a national level during the Olympic periods.

Ex- Ante and Ex- Post Economic Impact Evaluations

Many of the economic impact studies done on the Olympics are Ex-Ante evaluations. These ex- ante evaluations are a good indicator of what will happen to the economy of a host city during and following the Olympic Games but they are not a true assessment of the economic impact. Ex-post economic impact studies of hosting the Olympic Games are rare but can be extremely useful for prospective host cities. These studies are conducted long after the Games were held and are trending to become the

norm since the 2000 Games in Sydney. These studies can truly determine the long-run economic impact of hosting the Olympic Games.

One of the goals of this study is to look at what previous economic impact studies have done and to improve upon them. The Input-Output method is a good method to judge the true impact of hosting the Olympics. By using Preuss' model the economic impact of hosting the Olympics can now be used to look at the impact in the long run. This model can be used to measure the impact of several Summer Olympics instead of each Games individually. This will be useful because the model will be able to look at effects of each Games and compare them against each other. The OLS Regression method used for multiple Olympic Games can be used by prospective Olympic host cities to determine whether or not to host and to look at where an economic impact can be minimized and maximized. By examining ex-ante Olympic economic evaluations it is hard to determine whether or not the economic predictions actually came true. Making ex-post evaluations the best choice for this study. Ex-post evaluations are based on actual numbers and not predictions making them more accurate. Combining these two will qualitatively and quantitatively analyze the economic impact and will guide the host city in their bid for the Olympics.

The improvements to Tucker's model can help the significance of the findings. By using country variables as opposed to city variables, more data can be analyzed. This means that the regression can span from 1964 to 2011. Also, Tucker misses out on the opportunity to use more data by only studying the Summer Olympics. The variables that were added due to using national data are Birth Rate, Death Rate, Consumer Price Index, and Average Years of Primary Schooling completed by people over the age of 15. These

variables provide more explanatory power to help strengthen the model. The Consumer Price Index was used over Purchasing Power Parity because it provided more opportunities for the model.

All of these methods provide opportunities to measure the impact of hosting the Olympics. Each of these models contains positive and negative aspects when used. For this Olympic model, the choice was OLS regression combined with ex-post evaluations.

This chapter explains the theory used to examine Olympic employment rates by using the Ordinary Least Squares Regression model and was expanded by examining ex-ante and ex-post Olympic evaluations. The combination of both the OLS regression model with ex-post evaluations stretched across multiple Olympics is the best way to study the economic impact of hosting the Games. Looking at multiple Games compared against each other for the same eighteen-year period will be extremely useful for a prospective Olympic host nation. The employment impact will not be predictions but will be actual numbers by using ex-post evaluations. Together both of these ideas will lead to a successful comparison of each of the Olympic Games. The next chapter shows the data used to test the hypothesis on Olympic employment rates.

CHAPTER 3

DATA

This chapter describes the data used to test the hypothesis of the effect hosting the Olympics has on a country's employment rate levels. The data compiled for the model deals with the factors of a country's employment rate. The data was compiled from The World Data Bank and the International Labor Comparisons, which is an extension of the United States Department of Labor's Bureau of Labor Statistics. The data collected starts in the year 1960 and extends to 2011, this is due to the facts that both data banks begin and end in these years respectively. The time series for the data set ranges from fourteen to eighteen years depending on the Olympics and are broken into three periods (Pre-Olympic Period, Olympic Year, and Olympic Legacy Period). There are three hundred and sixty four observations for the data set and twenty-one variables.

The World Data Bank is a database mainly used to measure development indicators of countries from around the globe. The World Data Bank's data extends from 1960 to 2011. The data itself is not fully complete due to many factors. The factors that contribute to a data set not being complete range from countries not reporting data on some variables to countries not becoming independent until a certain year. The World Data Bank was the source of data on birth rate (per 1000 people), death rate (per 1000

people), consumer price index, and average years of primary schooling completed by people over of the age of 15.

The International Labor Comparisons databank is a branch of the United States Department of Labor's Bureau of Labor Statistics. The data from this database used was real GDP per capita, and Employment as a Percentage of Population. The real GDP per capita was manipulated by taking the logarithm in an attempt to solve the problem of non-linear parameters. The data derived from this data bank will provide the dependent variable for the model.

The dummy variables are country, Olympic period, and the season Olympics. The country dummy variable for the model is based on the fourteen countries that have hosted the Olympics since 1964. The country variables that are excluded are Mexico, the Soviet Union, Yugoslavia, Greece, China and the United Kingdom. The Mexico and Greece variables are excluded from the model due to lack of data for these countries. Data for communist nations simply does not exist or is skewed to the countries benefit, this applies for the 1980 Summer Olympics in Moscow, Soviet Union, 1984 Winter Olympics in Sarajevo, Yugoslavia, and the 2008 Summer Olympics in Beijing, China. Due to this, the Soviet Union, Yugoslavia, and China have been eliminated from the dataset. The 1968 Summer Olympics in Mexico City, Mexico and the 2004 Summer in Olympics in Athens Greece are eliminated because the data for Mexican and Greek employment does not exist. The United Kingdom variable was eliminated from the model because the data set does not include the year 2012, meaning that the 2012 Summer Olympics in London data set has not been reported. The Olympic period dummy variable is based on which category the observation falls in, either the four to

seven year pre-Olympic period that begins when an Olympic host city is selected to host the Olympics, the year that the Olympics take place, or the ten year legacy period that proceed the year the Olympics take place. The season of Olympics dummy variable identifies whether the games took place in the Summer or the Winter.

TABLE 3.1

OLYMPIC PERIOD INDICATOR VARIABLES

Olympic Period	Frequency	Percent
Pre- Olympic	128	38
Olympic Year	20	6
Legacy	165	50

Source: Author's calculations

The number of years in each of the three periods differs based on which Olympics are considered. The Olympics hosted in the early 1960s were selected three years prior to the year the Olympics were hosted, thus a fourteen year Olympic period was measured. The Olympics hosted in the 1970s were selected six years prior to the year the Olympics were hosted, thus a seventeen year Olympic period was measured. Currently, the Olympics are selected seven years prior to the Olympics being hosted thus an eighteen-year period is measured.

Variables

The employment variables in the Olympic model describe employment as a percentage of the population during the Olympic periods. The choice for the variables used, were based off of Lee Tucker's model for employment in an Olympic host city with some variations.

This Olympic model will expand upon Tucker's work by increasing the range of the data, including the Olympics starting in 1964 and including the Winter Olympiad.

The variables added from Tucker's model are Birth Rate, Death Rate, Consumer Price Index, and Average years of primary Schooling for people over the age of 15. These improvements will attempt to strengthen the model.

The log of Real GDP per Capita variable is use to measure the well-being of the population of a host nation. According to Williamson, "a real change in GDP is an increase in the actual quantity of goods and services (including, for example, the number of apples and oranges sold during a period of time), which is what the consumers ultimately care about." (Williamson, 49) The log of Real GDP per Capita variable can capture the economic well-being of the population during the Olympic periods. The logarithm of real GDP per capita was used to attempt to solve the problem of non-linear parameters. The birth and death rate variable can establish the well-being of the population of an Olympic host nation. The average years of primary schooling by people the age of 15 and older variable can directly coincide with employment in a host nation because educated citizens have a higher employment rate.

TABLE 3.2

EMPLOYMENT VARIABLE SUMMARY STATISTICS

Variable	Obs.	Mean	Std. Dev.	Min	Max
Employment as % of Population	333	45.57054	4.364195	31.91	53.55
Year	364	1987.791	13.74443	1960	2011
Japan	50	0.137363	0.344704	0	1
Austria	32	0.087912	0.283557	0	1
France	32	0.087912	0.283557	0	1
Germany	17	0.046703	0.211293	0	1
Canada	44	0.120879	0.326436	0	1
Rep. of Korea	18	0.049451	0.217105	0	1
Spain	17	0.046703	0.211293	0	1
Norway	17	0.046703	0.211293	0	1
Australia	18	0.049451	0.217105	0	1
Italy	13	0.035714	0.185832	0	1
Summer Olympics	174	0.478022	0.500204	0	1
Pre Olympic	140	0.384615	0.487174	0	1
Olympic Year	22	0.06044	0.238627	0	1
Legacy	182	0.5	0.500688	0	1
Birth Rate	359	15.0624	6.41195	8.41	44.84
Death Rate	359	8.822423	1.955917	5.3	13.4
Consumer Price Index	347	64.5221	31.61917	0.02	121.11
Average Years of Schooling	364	5.056566	1.059486	2.39	6.84
log Real GDP per Capita	364	10.04477	0.616713	7.88324	11.0279

Source: Author's Calculations

Observing the summary statistics for the variables in the model, no variables need to be eliminated due to lack of observation. The variables that this would have faced this issue were previously eliminated from the model.

The dependent variable for the study is employment as a percentage of the population in the Olympic host country on a yearly basis. The dependent variable is multiple data points used in order to control for variance. The data collection was

dependent on host countries providing information to the World Data Bank and International Labor Comparisons. There are many unforeseen variables that occur in host countries that effect employment. Examples include, Civil War in Yugoslavia during the Legacy Period, financial economic depression from the 2008 worldwide banking crisis that effected Greece during their Olympic Legacy Period, and saving and loan debacle during the Legacy Period for the Los Angeles Olympics. However, by using a large number of data points through many Olympics these should be limited.

Limitations and Associated Problems

The most significant limitation of this dataset is the lack of observations for the years and missing data. The variables for Mexico, the Soviet Union, Yugoslavia, Greece, China, and the United Kingdom have been eliminated for various reasons as discussed. The data is not currently up to date because the data for 2012 has not yet been recorded.

The problem associated with a twenty-one variable model is correlation. The variables with high correlation values .3 and above need to be monitored or simply taken out of the model to deal with the correlation problem. Removing the variables of high correlation problems, the model contains a dataset with twenty-one variables without problems. View the correlation matrix in the appendix (Table A.1).

This chapter provides an illustration for the data that will be used to examine Olympic employment rates during all three Olympic Periods. In conclusion, the data should provide enough evidence to test the impact hosting the Olympics has on national employment. Employment variables and dummy variables are used for the Olympic periods. By using least squared regression analysis the independent variables in this dataset will define the dependent variable of employment as a percentage of the

population in an Olympic host country. The next chapter provides an in depth look at the models regression analysis.

CHAPTER 4

RESULTS

This chapter will test the hypothesis to determine the impact hosting the Olympics has on a country's employment levels.

Olympic OLS Regression

The Olympic OLS Regression is a model that describes employment in a host country during the three Olympic Periods. The Olympic OLS Regression equation is:

$$\begin{aligned} \text{Employment} = & \beta_0 \text{constant} + \beta_1 \text{ year} + \beta_2 \text{ Japan} + \beta_3 \text{ Austria} + \beta_4 \text{ France} + \beta_5 \text{ Canada} + \beta_6 \\ & \text{United States} + \beta_7 \text{ Republic of Korea} + \beta_8 \text{ Spain} + \beta_9 \text{ Norway} + \beta_{10} \text{ Australia} + \beta_{11} \text{ Italy} + \\ & \beta_{12} \text{ summer} + \beta_{13} \text{ Pre} + \beta_{14} \text{ Olympic} + \beta_{15} \text{ Legacy} + \beta_{16} \log \text{ GDP} + \beta_{17} \text{ Birth Rate} + \beta_{18} \\ & \text{Death Rate} + \beta_{19} \text{ CPI} + \beta_{20} \text{ Schooling} + e \end{aligned} \tag{4.1}$$

Equation 4.1 and Equation 2.2 are equivalent statements. The only variable that is omitted from the model is the country variable, Germany. Germany's elimination was expected due to collinearity issues associated with the data.

TABLE 4.1
ROBUST OLYMPIC OLS REGRESSION RESULTS

Variable	Coefficient	T-score
Year	-0.0946699	(-1.42)
Japan	7.366422	(6.78)***
Austria	2.482515	(1.22)
France	-1.583281	(-1.08)
Germany	(omitted)	
Canada	0.8527651	(0.79)
United States	-0.6191889	(-0.73)
Rep. of Korea	-0.4886068	(-0.28)
Spain	-3.661084	(-2.76)***
Norway	-0.8189534	(-0.54)
Australia	1.896451	(1.87)*
Italy	-2.335219	(-2.13)**
Summer	-0.1410192	(-0.52)
Pre	0.3551195	(0.69)
Olympic Year	0.7312418	(1.27)
Legacy	0.6698355	(1.16)
Birth Rate	0.5423852	(5.13)***
Death Rate	0.6137806	(2.31)**
CPI	0.0935458	(4.04)***
Schooling	1.977737	(2.21)**
log GDP	1.967316	(1.45)
Constant	183.0376	(1.47)
Observations		312
R-sq. Value		0.8635

* indicates significance at the 90% confidence level, ** indicates significance at the 95% confidence level, *** indicates significance at the 99% confidence level

Source: Author's Calculations

Examining the regression results from the Olympic employment model provides insight to explain if hosting the Olympics has an effect on national employment.

Observing the regression results only some of the variables carry a high significance to

the model. The country variables that carry significance to the model are Japan, Spain, Australia, and Italy. Tourism in Spain and Italy was very high prior to the Olympics therefore it was unlikely for them to expect much employment in tourism to increase during the Olympic Periods. This means those countries would have difficulties in improving the employment effect like Japan and Australia. By studying the differences of these small nations, host countries may be able to come up with ways to improve their employment rates. The focus of the study was to monitor the growth in employment rates during the three Olympic periods. The study proved that hosting the Olympics, through all three Olympic periods, had no significant effect on the host nation's employment. Interestingly, all the Olympic Periods trended toward improved employment in Olympic host nations. The season that the Olympics took place had no effect on the model (Summer or Winter). Many variables nationally effect employment and it is difficult to believe that the short length of the actual Olympics could have a profound effect on nation employment rates. However, some nations trended toward employment improvement during the Olympic Periods. The variables with significance to the model for improvement on employment rates were birth rate, death rate, consumer price index, and average years of schooling completed by people over the age of 15. Some tests need to be done to make sure that the model is valid.

It is interesting that Japan and Australia experienced positive growth in employment rates and the Spain and Italy experienced negative impacts on employment rates. These negative impacts could be due to a plethora of reasons that could be explained in the model. For example, the economic downturn in the Europe during the late 2000s could possibly explain the negative effects to employment rates but were

unforeseen when these Olympic hosts were chosen. The variables of Birth Rate, Death Rate, Consumer Price Index, and Average Years of Schooling prove to be significant indicators of employment rates throughout the model.

There are problems associated with the model. Running a robust regression with standard errors rectified the problem of heteroskedasticity. The test for normality tests for the distribution of the standard errors. View the appendix to see the residuals plotted against a normal distribution. Acquiring more data would rectify this problem. The use of the log of Real GDP per capita was used to attempt to solve the problem of non-linear parameters. The use of more variables may have helped make the study more robust. The next step was to monitor each Olympic period separately and compare them against each other.

TABLE 4.2

PRE OLYMPIC, OLYMPIC YEAR, AND LEGACY PERIOD OLS REGRESSION

RESULTS

Pre Olympic Period			Olympic Year		Legacy Period	
Variable	Coef.	T-score	Coef.	T-score	Coef.	T-score
Year	0.2475298	(2.53)***	-0.1469826	(-0.76)	-0.0167156	(-0.2)
Japan	11.2854	(6.66)***	-1.199016	(-0.09)	0.9342497	(0.44)
Austria	4.37545	(0.83)	(omitted)		(omitted)	
France	1.017037	(0.24)	-2.231463	(-0.97)	-5.051162	(-5.08)
Germany	(omitted)		(omitted)		(omitted)	
Canada	5.080514	(4.12)***	-4.567071	(-0.37)	-6.234914	(-2.88)***
United States	3.436658	(2.4)**	-11.16125	(-0.79)	-6.972261	(-3.25)***
Rep. of Korea	-7.048496	(-2.87)***	-5.243139	(-0.47)	-5.018612	(-1.8)*
Spain	-1.959773	(-0.42)	1.50461	(0.45)	-8.013109	(-5.53)***
Norway	0.4288194	(0.1)	-22.4245	(-1.11)	-6.851118	(-2.66)***
Australia	3.6375	(2.41)**	-4.720977	(-0.35)	(omitted)	
Italy	-3.112193	(-1)	-4.6688	(-0.95)	-5.095799	(-3.86)***
Summer	-1.39568	(-3.18)***	-0.6571551	(-1.07)	0.3399167	(1.13)
Birth Rate	0.3885073	(3.37)***	1.040941	(4.12)**	0.4801274	(5.22)***
Death Rate	1.512484	(3.6)***	2.858465	(4.31)**	0.3527763	(1.4)
CPI	0.0437653	(1.22)	0.1894496	(2.61)	0.0089529	(0.29)
Schooling	2.778404	(0.96)	9.644557	(1.44)	3.677711	(4.19)***
log GDP	-5.749347	(-4.7)***	-4.678416	(-2.38)	3.011559	(2.24)**
Constant	-426.9137	(-2.35)**	289.4815	(0.81)	23.00189	(0.15)
Observation		131		19		152
R-Sq.		0.9296		0.997		0.9315

* indicates significance at the 90% confidence level, ** indicates significance at the 95% confidence level, *** indicates significance at the 99% confidence level

Source: Author's Calculations

By studying each Olympic Period individually there are differences from our original findings. The Pre Olympic and Olympic Legacy periods regression contains the same number variables with high significance to the model. The most interesting variable with no effect on the model was the average years of schooling completed by people over the age of 15. The Olympic Year Period regression shows no variables with high significance to the model and this is likely due to the small sample size. The Olympic Legacy Period regressions variables are all significant to the model with the exception of what season the Olympics took place in. There are collinearity issues associate with this regression, as the Austria, Germany, and Australia variables are omitted. When each period is run in a regression separately and against themselves, the results show a more positive trend than the original findings for employment in the Pre Olympic and Olympic Legacy Periods. The Olympic Year Period contains too small of a sample size to be considered relevant.

Overall Regression Analysis

Statistically, the Olympic Periods shows no significance in employment rates. The trend would suggest there might be some improvement during all the Olympic Periods but the results did not reach statistical significance.

In summary, this chapter shows that by studying employment differently than Tucker, there is no statistically significant difference in nation employment rates in host countries in all the Olympic Periods. When examining each period separately by country, the small sample size negates the Olympic Year period but suggests improvement in employment. The other periods suggest significant improvement in employment in certain countries.

CHAPTER 5

CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

This paper set out to find to out whether hosting the Olympics has any effect on employment as a percentage of the population on a national level. The regression analysis suggests no significant improvement in employment rates during the three Olympic periods. As a whole the regression analysis shows a trend toward improvement in employment rates for a host nation for all three Olympic Periods.

Countries need to take into account that hosting the Olympics will provide no boost in employment on the national level. Future countries aspiring to host Olympics need to look at the past Olympic nations to determine the value the Olympics would have. For example, a country that is larger in the tourism industry should really be cognizant of hosting the Olympics in view of the results provided for Spain and Italy. Hosting the Olympics has no effect on employment in host nations but it might give insight on how to maximize the trend toward employment improvement. For example, Australia and Japan have the highest improvement in employment rates during the Olympic periods. By studying these two countries in comparison to the other nations, a future host country may be able to amplify employment.

In the future, research improvements can be made to this model. Studying more Olympics with updated data will give the statistics and research more depth into the

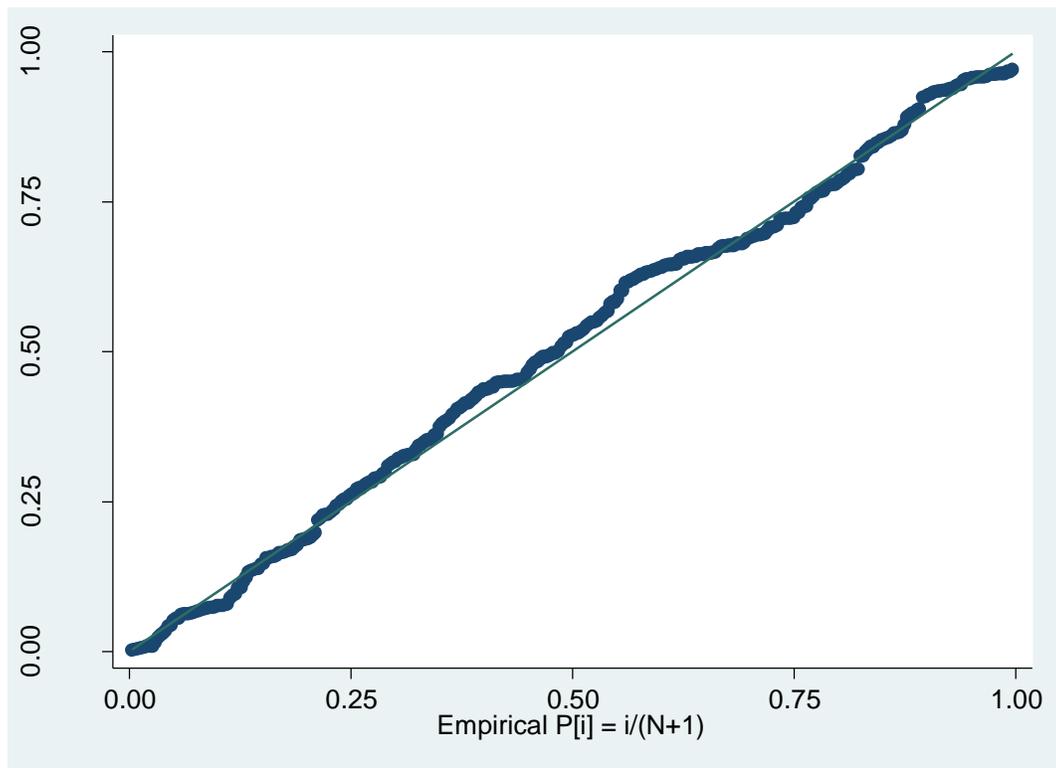
question of employment. More reliable data from excluded countries like China and the former Soviet Union would strengthen this study. An in depth break down of employment by industry could pinpoint the employment statistics and help examine were the Olympics improved employment. Looking back further at previous Olympics might provide a more in depth look at Olympic employment. Finding more data for the excluded countries would help with this as well. A breakdown of employment into the categories that define it might provide interesting information as to which industries experience the biggest boost during the Olympic period.

Overall, hosting the Olympics provides a sense of national pride to the host nation. It also boosts the host nations profile to the World. Based on the results found in this study, hosting the Olympics has no statistically significant effect on national employment rates but shows a trend toward improvement in all three periods. Further studies are required to improve employment during the Olympic Periods in order to substantiate hosting the Olympics.

Appendix A

FIGURE A.1

RESIDUALS PLOTTED AGAINST NORMAL DISTRIBUTION



Source: Author's Calculations

TABLE A.1

OLYMPIC EMPLOYMENT VARIABLES CORRELATION MATRIX

	Year	Japan	Austria	France	Canada	United States	Rep. of Korea	Spain	Norway	Australia	Italy	Summer	Pre	Olympic	Legacy	Birth Rate	Death Rate	CPI	Schooling	log GDP	
Year	1.00																				
Japan	-0.22	1.00																			
Austria	-0.36	-0.13	1.00																		
France	-0.12	-0.13	-0.10	1.00																	
Canada	0.00	-0.16	-0.12	-0.12	1.00																
United States	0.14	-0.20	-0.16	-0.16	-0.19	1.00															
Rep. of Korea	0.02	-0.10	-0.08	-0.08	-0.09	-0.12	1.00														
Spain	0.10	-0.09	-0.07	-0.07	-0.09	-0.11	-0.05	1.00													
Norway	0.13	-0.09	-0.07	-0.07	-0.09	-0.11	-0.05	-0.05	1.00												
Australia	0.23	-0.10	-0.08	-0.08	-0.09	-0.12	-0.06	-0.05	-0.05	1.00											
Italy	0.23	-0.08	-0.06	-0.06	-0.07	-0.09	-0.04	-0.04	-0.04	-0.04	1.00										
Summer	0.02	-0.13	-0.29	-0.29	-0.04	0.05	0.26	0.25	-0.21	0.26	-0.17	1.00									
Pre	-0.12	-0.04	-0.05	-0.05	0.06	-0.02	0.00	-0.02	-0.02	0.00	0.08	0.00	1.00								
Olympic	-0.03	0.00	0.00	0.00	0.01	0.00	-0.01	0.00	0.00	-0.01	0.02	-0.01	-0.20	1.00							
Legacy	0.10	-0.08	0.09	0.09	-0.02	0.08	0.03	0.04	0.04	-0.23	-0.06	0.00	-0.78	-0.25	1.00						
Birth Rate	-0.54	-0.05	-0.04	-0.02	-0.07	-0.01	0.05	-0.18	-0.06	-0.07	-0.17	0.26	0.00	0.01	0.02	1.00					
Death Rate	-0.22	-0.36	0.68	0.22	-0.31	-0.01	-0.37	0.01	0.19	-0.25	0.11	-0.34	0.03	0.01	0.11	0.05	1.00				
CPI	0.94	-0.02	-0.28	-0.11	-0.01	0.10	-0.08	0.04	0.15	0.22	0.21	-0.12	-0.11	-0.03	0.04	-0.67	-0.22	1.00			
Schooling	0.51	0.19	-0.52	-0.36	0.19	0.36	0.03	-0.17	0.36	0.18	-0.09	0.05	-0.01	-0.02	-0.06	-0.46	-0.56	0.57	1.00		
log GDP	0.64	-0.15	-0.12	0.01	0.14	0.37	-0.28	0.03	0.29	0.16	0.11	-0.32	-0.09	-0.02	0.07	-0.73	-0.05	0.72	0.63	1.00	

Source: Author's Calculations

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