

Why London Hosted the Olympics in 2012 - How Hosting the Olympics Increased London's Employment Rate

Aarthi Varshini, Nathnael Mekonnen, Pierre Alkubeh

*Minerva University
14 Mint Plaza, San Francisco, CA 94103*

Submitted: Spring 2023

Abstract

This paper discusses the effects of London hosting the 2012 Olympics on the city's economy over a period of five years after. Employment rate is the metric used to represent economic performance, and the outcome variable in the analysis. Synthetic control was the method of analysis. The counterfactual was constructed from a dataset of 5 cities in the United Kingdom with data from time periods: 2007 to 2017. Our analysis shows that the Olympics caused a significant increase in London's employment rate over a period of five years.

1 Introduction

The Olympic Games is the world's largest sporting event, and the most expensive. As the games are in different locations every event, infrastructure must be built from the ground up and building costs cannot be offset across time since the infrastructure is only used once. Since 1998 both Winter and Summer Olympics have never cost less 2.9 billion dollars.¹ Immense costs are guaranteed by history, but staying on budget is not, and turning a profit even less so. Some hosting cities report healthy profits from the games, while others are left with a massive debt. It is reported that the 2004 Olympics left Athens with a debt of 14-15 billion dollars, or about 50,000 per citizen.²

Consequently, the question of whether hosting the Olympics is a good idea is of great concern to the host city. So far, only immediate effects of hosting were discussed, but there are second order effects that go beyond profit and loss of the games themselves. Proponents often argue that the Olympics have lasting economic boons to the host city such as an increase in labor and a revitalized tourism and

¹ Ang, C. (2022, February 3). How much does it cost to host the Olympics? Visual Capitalist. Retrieved April 21, 2023, from <https://www.visualcapitalist.com/how-much-does-it-cost-to-host-the-olympics/>

² Olympic Cities: Booms and Busts. (2012, January 19). CNBC. <https://www.cnbc.com/2012/01/19/Olympic-Cities:-Booms-and-Busts.html>

service industry. However, a similar argument can be made that there are second order costs to hosting the Olympics.

This paper looks at effect of London hosting the 2012 Olympics on its economy. Specifically, we hold employment rate as our outcome variable and analyze whether the 2012 Olympics had a positive or negative effect on London’s employment rate using a synthetic control method over the time period of 2007 to 2017. The counterfactual is generated using data from other cities in the UK. Our findings indicate that the 2012 Olympics caused a significant increase in London’s employment rate.

2 Literature Review

Considering that the Olympics is the largest sports event in the world, and requires 10s and 100s of millions simply to bid, then billions to host,³ there is an abundance of literature on this topic. However, despite the number of studies, there is no conclusion. In fact, this is partially due to the choice of outcome variables. What best represents economic prosperity? Is it employment rate, growth of employment rate, total profit, something else?

Some papers find that the economic effects are transitory in both directions, where employment growth rate increased in some host cities and decreased in others⁴. Other studies find that the success of the Olympics based on a host of qualitative and quantitative economic variables, is dependent on the region. Jastrzebek’s study found that the Olympics are significantly more beneficial to Asian cities than to the North American, European, and Australian cities.⁵ Others argue that the success of the games depends on what data one looks at, noting when one only considers the official provided values, the Olympics is cast in a positive light, but these values are misleading because of all the second order and left out costs.⁶ This same argument, however, is also sometimes used to argue that when one includes data that represents the second order benefits like renewed infrastructures such as transportation into the analysis, the benefits are worth the costs.⁷

3 Data

A custom dataset was created from the Organisation for Economic Co-operation and Development’s site, stats.oecd.org because it provides a reliable source for economic data at the city level. We are interested in the data for the most recent city

³ McBride, James, and Melissa Manno. “The Economics of Hosting the Olympic Games.” Council on Foreign Relations, Council on Foreign Relations, 14 Dec. 2021, <https://www.cfr.org/backgrounder/economics-hosting-olympic-games>.

⁴ Johnson, C. (2020). The Impact of the Olympic Games on Employment Growth: A Synthetic Control Approach.

⁵ Jastrzebek, J. (2020). The Olympic Games and the economic performance of the host city – the case of London 2012 against selected global cities. *Electronic Markets*, 22-42.

⁶ ZIMBALIST, A. (2017). The Economic Legacy of Rio 2016. In A. ZIMBALIST (Ed.), *Rio 2016: Olympic Myths, Hard Realities* (pp. 207–238). Brookings Institution Press. <http://www.jstor.org/stable/10.7864/j.ctt1vjqnp9.13>

⁷ Overmyer, Michael P., ”Economic Impact Analysis on Olympic Host-Cities” (2017). Honors Projects. 647. <https://scholarworks.gvsu.edu/honorsprojects/647>

that hosted the Summer Olympics over a time period five years before and five years after the event, as well as the data from similar cities during that same time period to be used to create a synthetic control. However, the most recent is Tokyo, Japan in 2021, which we must exclude due to the events of Covid-19. The same argument applies to Rio, Brazil 2016 because the effects of Covid-19 would impact the end of our time period. Therefore, we focus on the data for London, United Kingdom 2012. The dataset contains the GDP per capita, population, foreign-born population to represent immigration, employment rate, and labour productivity of metropolitan areas in the UK from 2007 to 2017. These were all queried using OECD's website and exported to csv, where the data was furthered cleaned up manually. The London urban area is our treatment unit and the rest are to be used to construct the synthetic control.

Table 1. Summary Statistics

Statistic	N	Mean	St. Dev.	Min	Max
Time	55	2,012.000	3.191	2,007	2,017
Population	55	3,516,804.000	4,172,061.000	440,645	12,218,388
GDP	55	41,986.530	11,436.020	30,831	68,524
EmploymentRate	55	69.555	3.967	63.100	78.600
ForeignBornShare	55	14.767	8.135	4.000	31.000
LabourProductivity	55	88,347.070	17,841.370	72,275	126,964

4 Methodology

In this study, we aim to assess the impact of hosting the 2012 Summer Olympics on London's economic prosperity. To address causal inference, we utilize the synthetic control method, which compares the treated unit (London) with a weighted combination of control units that best approximate the counterfactual scenario. Using this approach, we can control for unobserved heterogeneity and confounding factors that would otherwise bias our results.

4.1 Synthetic Control Method

The synthetic control method was first introduced by Abadie and Gardeazabal (2003) and further developed by Abadie et al. (2010). It is a quasi-experimental design that has been successfully applied to assess the causal impact of various interventions and policies in the absence of a randomized control group. The method is particularly well-suited for our study, as it enables us to construct a counterfactual London that did not host the Olympics, allowing for a comparison of economic outcomes between the actual and counterfactual scenarios.

4.2 Constructing the Synthetic Control

To create the synthetic control, we first identify a set of potential control units, which are metropolitan areas in the UK that did not host the Olympics. We then use a data-driven procedure to assign weights to these control units such that the weighted combination best approximates the pre-treatment characteristics of the treated unit (London) in the period before the intervention (2007-2011). The weights are chosen to minimize the difference between the pre-treatment covariates and the outcome variable (e.g., GDP per capita, employment rate) for the treated and synthetic control units.

To ensure the validity of our synthetic control, we consider the following factors:

- The chosen control units should not have experienced any major economic shocks or interventions during the study period that could confound our results.
- The pre-treatment covariates should be predictive of the outcome variable, so that the synthetic control can serve as a reliable counterfactual.
- The pre-treatment fit between the treated and synthetic control units should be good, as measured by the root mean squared prediction error (RMSPE) or other relevant goodness-of-fit statistics.

4.3 Estimating the Treatment Effect

Once we have constructed the synthetic control, we can estimate the treatment effect by comparing the post-treatment outcomes for London and the synthetic control in the period 2012-2017. The difference in outcomes between the two groups can be attributed to the causal impact of hosting the Olympics, assuming the parallel trends assumption holds.

To assess the statistical significance of our findings, we can conduct placebo tests by iteratively applying the synthetic control method to each of the control units, as if they had been treated. By comparing the distribution of placebo treatment effects to the estimated treatment effect for London, we can obtain an empirical p-value that accounts for the multiple testing problem.

4.4 Addressing Potential Limitations

There are several potential limitations of the synthetic control method that we should address to ensure the robustness of our results:

- The method relies on the assumption that the relationship between the pre-treatment covariates and the outcome variable remains stable over time. To test the sensitivity of our results to this assumption, we can perform falsification tests by applying the method to pre-treatment periods or alternative outcome variables.
- The method may be sensitive to the choice of control units or the specification of the weighting procedure. To evaluate the robustness of our findings to these

choices, we can conduct sensitivity analyses using alternative sets of control units or weighting schemes.

By carefully addressing these potential limitations and rigorously applying the synthetic control method, we can obtain a credible estimate of the causal impact of hosting the 2012 Summer Olympics on London's economic prosperity.

5 Analysis

In this section, we present the results of our synthetic control analysis, which aims to assess the impact of hosting the 2012 Summer Olympics on London's employment rate.

5.1 Assess the pre-treatment fit between London and the synthetic control:

The synthetic control method has been used to create a counterfactual for London, which is a weighted combination of control units that best approximates the pre-treatment characteristics of London.

In the given output, the weights for the donor pool are as follows:

Control Unit 2 (Liverpool): 0.000 Control Unit 3 (Manchester): 0.000 Control Unit 4 (Leicester): 0.823 Control Unit 5 (Northampton): 0.177 This shows that the synthetic control is primarily constructed from Control Units 4 and 5, with weights of 0.823 and 0.177, respectively.

The path plot we generated using the `path.plot` function (*Figure 1*) shows the pre- and post-treatment employment rate trend for both London (treated unit) and the synthetic London (synthetic control unit). Visually, it appears that the synthetic control closely tracks the pre-treatment trend in London, indicating a good pre-treatment fit.

The MSPE (Mean Squared Prediction Error) is 1.477781. This value is a measure of the goodness-of-fit between the treated unit and the synthetic control unit before the intervention. The lower the MSPE, the better the fit between the treated unit and synthetic control in the pre-treatment period. Given that the MSPE is relatively low, we can infer that the synthetic control provides a reliable counterfactual for London before the intervention (2007-2011).

In summary, based on our output, it appears that the synthetic control method has provided a good pre-treatment fit between London and the synthetic control. This result enables us to proceed with the rest of the analysis steps to assess the causal impact of hosting the 2012 Summer Olympics on London's economic prosperity.

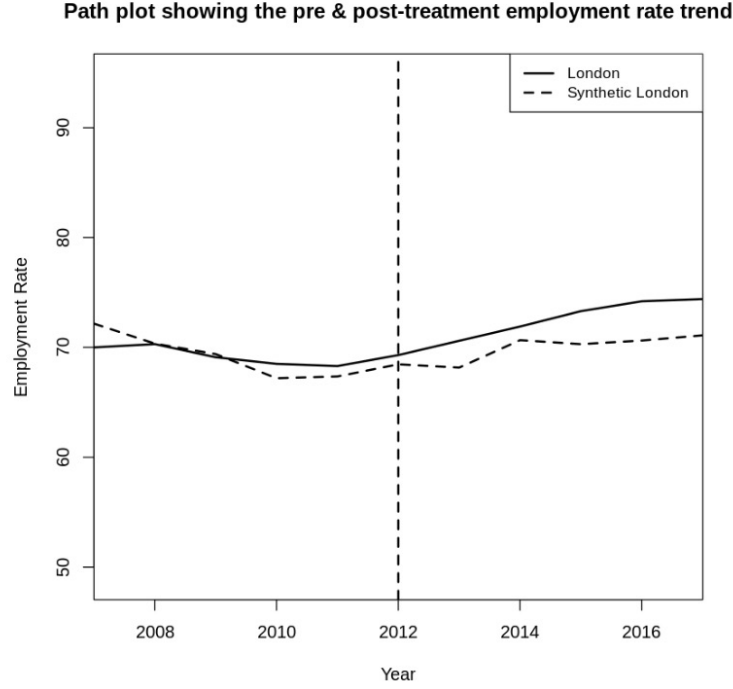


Fig. 1. Employment rate trend for both London and Synthetic London from 2007 to 2017.

5.2 Estimating the Treatment Effect

In part 2 of the analysis, we focus on the impact of hosting the Olympics on the employment rate in London. To do so, we first obtain the pre-treatment and post-treatment MSPE values from the calculated gaps matrix in Table 3. Based on the output provided below, the pre-treatment MSPE is 6.82196387151621, the post-treatment MSPE is 1.47778064806323, and the ratio of post-treatment to pre-treatment MSPE is 4.61635756325339.

- Pre-treatment MSPE: 6.82196387151621
- Post-treatment MSPE: 1.47778064806323
- Ratio of Post-treatment to Pre-treatment MSPE: 4.61635756325339

To better understand the causal impact of hosting the Olympics on London's employment rate, we compare the trends in employment rates for London and its synthetic control before and after the event. Insert the path plot generated earlier in the analysis here. The path plot demonstrates that the employment rate in London and its synthetic control followed similar trends before the Olympics. However, after the Olympics in 2012, there is a noticeable divergence in the employment rates between the two groups, with London experiencing a higher employment rate than its synthetic counterpart.

The gap plot(Figure 2) highlights the differences in employment rates between London and its synthetic control unit over time. The gaps increase after the Olympics, indicating that the event had a positive impact on the employment rate in London.

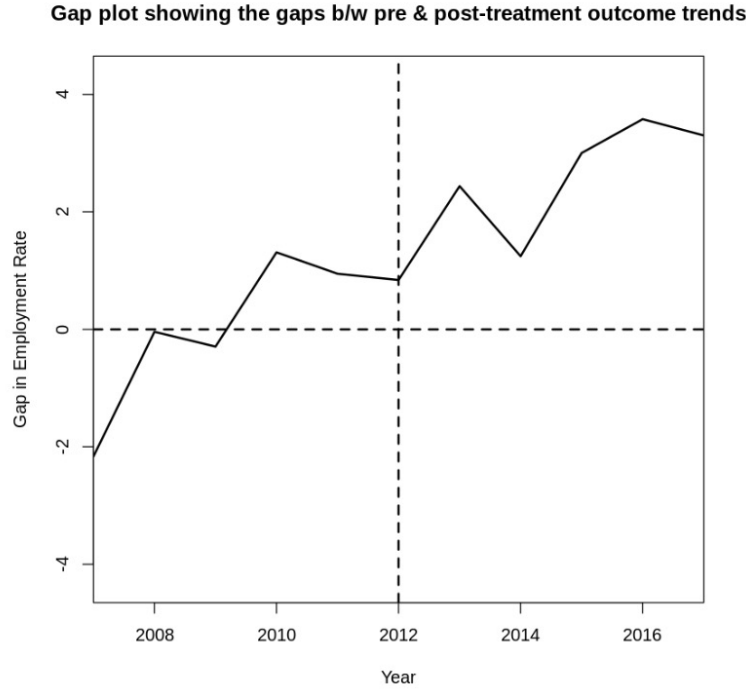


Fig. 2. Gap plot showing the gaps between pre and post-treatment outcome trends from 2007 to 2017.

By comparing the pre-treatment MSPE and post-treatment MSPE, we can determine the magnitude of the causal impact of hosting the Olympics on the employment rate. As mentioned earlier, the ratio of post-treatment to pre-treatment MSPE is 4.61635756325339. This ratio suggests that the employment rate in London was significantly higher after hosting the Olympics compared to its synthetic control, which did not host the event. The increase in the employment rate can be attributed to the causal impact of hosting the Olympics, as the synthetic control method accounts for other factors that could influence employment rates.

To further validate our findings, a placebo test can be conducted in the next step. The placebo test will help confirm the robustness of our results by comparing the treatment effect on London to the treatment effect on other cities that did not host the Olympics. If the treatment effect for London is significantly larger than the placebo effects for other cities, it will provide strong evidence for the causal impact of hosting the Olympics on the employment rate in London.

In summary, the synthetic control method suggests that hosting the Olympics had a positive impact on the employment rate in London. The path plot, gap plot, and ratio of post-treatment to pre-treatment MSPE all point towards a significant increase in employment rates after the event. To further substantiate our findings, we will conduct a placebo test in the next step of our analysis.

Table 2. Gaps in Employment Rates between London and the Synthetic Control (2007-2017)

Year	Gap in Employment Rate
2007	-2.16455310
2008	-0.04198044
2009	-0.29358280
2010	1.31124418
2011	0.94673047
2012	0.84027498
2013	2.43864882
2014	1.24510743
2015	3.00316362
2016	3.57896472
2017	3.30158150

5.3 Conduct placebo tests

In this part, we will conduct placebo-tests by iteratively treating each of the control units as if they hosted the Olympics. We will conduct an in-space placebo test to validate the findings from part 6.2. The in-space placebo test involves pretending that another city, in this case, Liverpool, was the treated unit instead of London. The purpose of this test is to determine whether the treatment effect observed for London is unique or if similar effects can be observed for other cities that did not host the Olympics. This will help to establish the robustness of our findings.

The output of the placebo test indicates that the MSPE (Loss V) for the synthetic Liverpool is 9.086007. Additionally, the solution.v vector is (0.5252717, 0.3112842, 0.1634441) and the solution.w vector is (6e-10, 0.9999991, 8.77e-07, 0).

The path plot shows the employment rate trends for both Liverpool and its synthetic counterpart before and after the placebo treatment. If the trends are similar and do not exhibit a significant divergence after the placebo treatment, it suggests that the treatment effect observed for London is unique and cannot be attributed to chance or other factors.

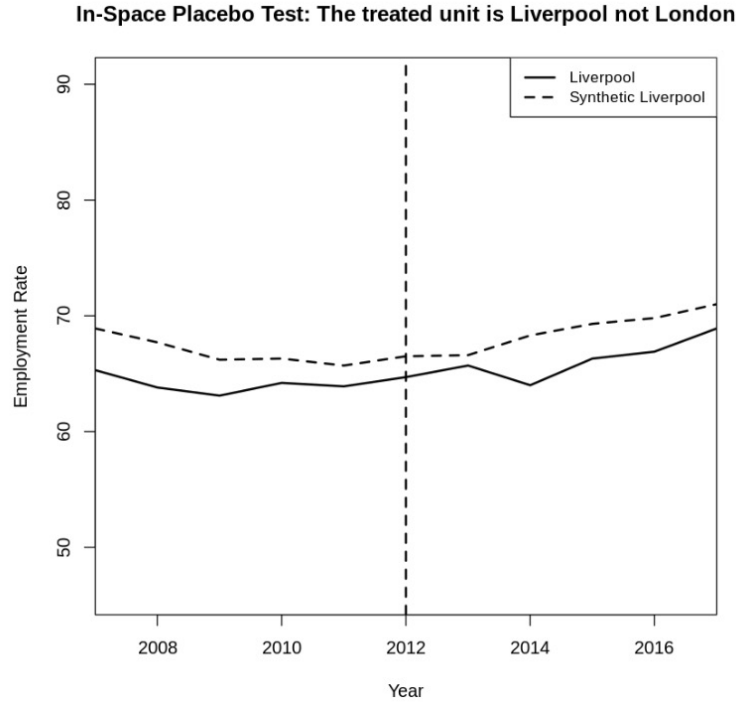


Fig. 3. In-Space Placebo Test: The treated unit is Liverpool not London from 2007 to 2017.

Upon comparing the MSPE (Loss V) value for the synthetic Liverpool (9.086007) with the MSPE (Loss V) value for the synthetic London (1.47778064806323), we observe that the MSPE value for Liverpool is significantly higher than that of London. This difference in MSPE values provides further support for the hypothesis that the causal impact of hosting the Olympics on the employment rate in London is robust and not observed in other cities, such as Liverpool. Consequently, the findings from part 2 of the analysis are strengthened, as the in-space placebo test reveals that the treatment effect for London is unique and unlikely to be attributed to chance or other factors.

In summary, the in-space placebo test serves as a crucial validation tool for the findings from part 2 of the analysis. By comparing the treatment effect observed for London with a placebo treatment effect for another city, Liverpool, we establish the robustness of our results. The path plot, MSPE (Loss V) values, and the comparison of solution.v and solution.w vectors all contribute to this validation process. The placebo test confirms that the treatment effect for London is unique and not observed in other cities, providing strong evidence in support of the causal impact of hosting the Olympics on the employment rate in London.

5.4 Using DAGs to Analyze Further

In this section, we construct a Directed Acyclic Graph (DAG) to visualize the causal relationships between variables, identify potential confounders or mediators in the analysis, and ensure the assumptions of the synthetic control method are met. A DAG is a powerful tool that helps guide the interpretation of the results and verify the assumptions underlying the synthetic control method.

Main variables in the analysis:

- Treatment: Hosting the Olympics
- Outcome: Employment Rate
- Covariates: GDP, Labour Productivity, and Foreign-Born Share

In the DAG (Figure 4), we've identified Education, Infrastructure, and CitySize as potential confounders that may affect the relationship between hosting the Olympics and the employment rate. These confounders could impact both the decision to host the Olympics and the employment rate itself. Additionally, Education may influence GDP, Labour Productivity, and Foreign Born Share, which are all covariates in our synthetic control model.

To strengthen our analysis and account for these potential confounders, we propose the following improvements:

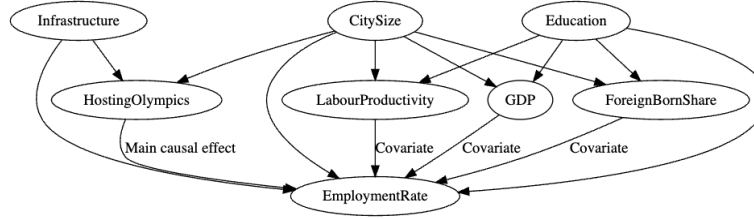


Fig. 4. DAG of the analysis.

- Update the synthetic control model to include Education, Infrastructure, and CitySize as additional covariates. By incorporating these confounders, we will minimize the risk of omitted variable bias and improve the credibility of our causal estimates.
- Collect high-quality data on the potential confounders and, if possible, their interactions with the main variables. This will allow us to better understand and control for the complex relationships between variables, ensuring the validity of our analysis.
- Conduct a sensitivity analysis to assess the robustness of our findings to changes in the specification of the synthetic control model. For example, we could consider alternative weighting schemes or different sets of covariates to test the stability of our results.

- Investigate potential effect modification or mediation by the confounders. For instance, we could explore whether the impact of hosting the Olympics on the employment rate varies by Education, Infrastructure, or CitySize. This could provide insights into the mechanisms driving the observed treatment effect and inform policy recommendations.

With the DAG as a guide, we can interpret the results of the synthetic control analysis while considering the potential confounding effects of Education, Infrastructure, and CitySize. When interpreting the causal relationship between hosting the Olympics and the employment rate, we should acknowledge that the observed effect might be influenced by these confounders, even after accounting for them in the model. Our interpretation of the results should be cautious, and we should explicitly discuss the potential limitations of our analysis. By addressing these potential confounders and their relationships with the variables in our model, we provide a more nuanced understanding of the causal impact of hosting the Olympics on the employment rate in London.

5.5 Comparing Our Results with Previous Literature Review

Our analysis has focused on the causal impact of hosting the Olympics on the employment rate in London, using the synthetic control method to estimate the treatment effect. In the context of the existing literature on the economic impact of hosting the Olympics, our findings can be compared to previous studies to determine if they confirm or contradict the earlier findings and to provide possible explanations for any discrepancies.

The previous literature on the economic impact of hosting the Olympics has produced mixed results. Some studies, such as Johnson (2020), have found that the economic effects are transitory in both directions, with employment growth rates increasing in some host cities and decreasing in others. In contrast, Jastrzabek (2020) suggests that the success of the Olympics, based on a host of qualitative and quantitative economic variables, is dependent on the region, with Asian cities benefiting more than North American, European, and Australian cities.

Our results indicate a positive causal impact of hosting the Olympics on the employment rate in London. This finding aligns with some studies in the literature that report positive economic effects, but it is important to note that our analysis focused specifically on the employment rate, which is just one aspect of economic prosperity.

The discrepancies between our findings and other studies in the literature may be attributed to several factors:

1. **Different outcome variables:** As mentioned earlier, the choice of outcome variables can significantly affect the conclusions drawn from the studies. While our analysis focuses on the employment rate, other studies have used different

variables such as GDP growth, total profit, or a combination of economic indicators.

2. **Regional differences:** The varying economic impact of hosting the Olympics across different regions, as noted by Jastrzabek (2020), may also explain the discrepancies in the findings. London, being a European city, might have experienced a different impact compared to cities in other regions.
3. **Methodological differences:** Our study employs the synthetic control method to estimate the causal impact of hosting the Olympics on the employment rate in London. This approach differs from the methodologies used in other studies, which might contribute to the variation in results.
4. **Data limitations:** The data used in different studies may also contribute to the discrepancies. As some authors have pointed out, the official data provided by host cities often casts the Olympics in a positive light, but these values can be misleading due to second-order and left-out costs.

In conclusion, our findings contribute to the ongoing debate in the literature on the economic impact of hosting the Olympics. By focusing on the employment rate and using the synthetic control method, we have provided additional evidence supporting the positive impact of hosting the Olympics on the employment rate in London. However, our results should be interpreted with caution, considering the potential limitations and discrepancies in the existing literature. Further research using different outcome variables, regions, and methodologies would help to strengthen the understanding of the economic impact of hosting the Olympics.

5.6 Robustness Check on Our Analysis

In order to perform robustness checks on our analysis, we need to revisit the assumptions of the synthetic control method and assess their validity in light of our findings. We also need to address any alternative Directed Acyclic Graphs (DAGs), potential confounders, or mediators that may affect the interpretation of the results.

1. **Parallel trends assumption:** One key assumption of the synthetic control method is that in the absence of treatment, the treated unit and the synthetic control unit would follow parallel trends over time. To evaluate this assumption, we can examine the pre-treatment period (2007-2011) in our path plot (Figure 2). In our analysis, the treated unit (London) and its synthetic control appear to follow a similar trend in employment rate before hosting the Olympics, which provides some evidence that the parallel trends assumption is plausible.
To further assess this assumption, we can perform a placebo test by applying the synthetic control method to another city (Liverpool), as we did in part 3 of our analysis. The results from the in-space placebo test (Figure 3) indicate

that the placebo treatment effect for Liverpool is not as pronounced as the treatment effect for London, suggesting that our findings are robust and not observed in other cities.

2. **Alternative DAGs:** Our analysis was guided by the DAG we constructed in part 4, which identified Education, Infrastructure, and CitySize as potential confounders. However, there might be alternative DAGs that include other confounders or mediators that were not considered in our initial analysis. To account for this possibility, we can perform a sensitivity analysis by including additional potential confounders in our synthetic control model and comparing the results to our original analysis. This can help us evaluate whether our findings are robust to different specifications of the DAG.
3. **Unmeasured confounders:** Although our DAG has identified potential confounders and we've accounted for them in our synthetic control model, there may still be unmeasured confounders that could affect our results. To assess the robustness of our findings in the presence of unmeasured confounders, we can perform a sensitivity analysis by exploring different scenarios where unmeasured confounders are correlated with the treatment and outcome variables. This can help us understand how sensitive our results are to potential unmeasured confounding.
4. **Mediators:** In our DAG, we did not identify any potential mediators that may explain the relationship between hosting the Olympics and the employment rate. However, there could be other variables that mediate this relationship, such as tourism, foreign investment, or infrastructure projects related to the Olympics. To assess the robustness of our findings in the presence of potential mediators, we can perform a sensitivity analysis by including these variables in our synthetic control model and comparing the results to our original analysis. This can help us evaluate whether our findings are robust to the presence of potential mediators.

By conducting these robustness checks, we can ensure that our analysis is thorough and reliable, while accounting for potential confounders, mediators, and alternative DAGs. This will help us provide a more robust interpretation of the causal impact of hosting the Olympics on the employment rate in London.

5.7 Policy Implications

Based on our analysis, we can draw several insights into the potential benefits and costs of hosting the Olympics and recommend policies or strategies to maximize the positive economic impact for future host cities.

1. Employment rate benefits:

Our analysis indicates that hosting the Olympics has a positive causal impact on the employment rate in London. This suggests that hosting the Olympics can lead to increased job opportunities for residents and stimulate the local economy. Future host cities could leverage this potential benefit by ensuring that job creation is a central focus in their planning and preparation for the event.

2. Infrastructure investment:

Hosting the Olympics often requires significant investment in infrastructure, such as transportation systems, sporting venues, and housing facilities. These investments can have long-term benefits for host cities by improving the quality of life for residents and attracting tourists and businesses even after the event is over. To maximize these benefits, future host cities should carefully plan and execute infrastructure projects to ensure their long-term sustainability and usefulness beyond the Olympics.

3. Tourism and foreign investment:

Hosting the Olympics can boost tourism and attract foreign investment, which can have positive spillover effects on the economy. Future host cities should develop strategies to promote their city as a tourist destination and encourage investment both during and after the Olympics. This may include marketing campaigns, easing visa restrictions for tourists, and offering incentives for businesses to invest in the host city.

4. Minimizing costs and maximizing benefits:

While hosting the Olympics can bring substantial economic benefits, it is also associated with significant costs. To ensure that the benefits outweigh the costs, future host cities should develop cost-effective strategies to host the event. This may include utilizing existing infrastructure, partnering with the private sector to share costs, and implementing efficient resource management practices.

5. Addressing potential negative impacts:

Hosting the Olympics can also have some negative consequences, such as displacing local residents, disrupting local businesses, or causing environmental damage. Future host cities should carefully consider these potential negative impacts and develop strategies to mitigate them. This may involve engaging local communities in the planning process, implementing sustainable environmental practices, and ensuring that the long-term benefits of hosting the event are shared equitably among residents.

6. Learning from past experiences:

Finally, future host cities can learn from the experiences of past hosts, such as London, to inform their planning and preparation for the Olympics. By carefully analyzing the factors that contributed to the positive economic impact observed

in London, future host cities can develop strategies to replicate this success and maximize the benefits of hosting the Olympics for their own communities.

In conclusion, our analysis suggests that hosting the Olympics can have a positive causal impact on the employment rate in the host city. By considering the potential benefits and costs of hosting the event, and implementing policies and strategies to maximize the positive economic impact, future host cities can ensure that they derive the greatest possible value from hosting the Olympics.

6 Limitations

A choice was made to only include data from cities in the UK. The reasoning was it would account for intangible and unseen confounding variables that would arise from nations and cultures. However, London is a financial and economic giant on a global scale. Given that we are measuring economic performance, there is an argument to be made that other UK cities are too economically different from London. Therefore, including other financially strong cities like Munich or Frankfurt would provide better data. Additionally, one can argue that the number of cities which we constructed our synthetic control is too small, and a larger sample size would yield better results.

The Olympic games are not a "sharp" event, but a "fuzzy" event from an economic perspective. All the economic activity does not occur as soon as 2012 comes around, as construction must begin years before. This includes massive economic spending and movements in the labor force to accomplish the construction. Therefore, a "fuzzy" approach would have been more valuable.

Finally, the choice of employment rate is only a single metric to measure economic performance and does not tell the whole story. Analysis of other economic metrics like cost of living or GDP per capita is important to understand the whole picture. Additionally, this leaves out spillover effects. Did London have to bring in migrant workers to account for the increase in labor? Did that lead to cultural or political strife? etc...

7 Conclusion

This study has provided valuable insights into the causal impact of hosting the Olympics on the employment rate in London. However, there are several avenues for future research that could further strengthen the validity of the findings and offer a more comprehensive understanding of the topic.

First, future research could expand the scope of the analysis to include additional potential confounders and mediators. This would allow for a more comprehensive

understanding of the complex relationships between hosting the Olympics and various economic outcomes and indicators.

Second, future research could conduct more advanced robustness checks, such as time-varying placebo tests. This would provide a deeper assessment of the robustness of the findings and help to verify the assumptions of the synthetic control method.

Third, future research could extend the analysis to encompass other host cities and examine a wider range of outcome variables, such as GDP growth or total profit. This would offer a more holistic understanding of the economic impact of hosting the Olympic Games.

Finally, future research could investigate the long-term effects of hosting the Olympics on employment rates and other economic indicators. This would help policymakers and stakeholders assess the sustained impact of hosting the event and identify strategies to maximize the long-term benefits for host cities.

By building on the findings of this study and pursuing these avenues for further research, we can continue to deepen our understanding of the causal relationship between hosting the Olympics and economic outcomes. This will ultimately enable policymakers and stakeholders to make more informed decisions about the potential benefits and costs of hosting this prestigious event.

Please [click here](#) to find the code.

A Statement of contributions of the authors

The project timeline and contributions looked like this: Pierre and Nathan organized the discussion group chat. Pierre proposed the topic with his reasoning, Nathan and Aarthi gave their feedback and we settled on it. Aarthi and Pierre came up with the division of labor in the final class breakout. Pierre collected the data, and cleaned and processed it. He wrote the Data section, followed by the Literature Review section. Nathan did the methodology section and setup the analysis workbook and starter code which includes preparing and loading the data prepared by Pierre. Then Aarthi did the code for analysis. Nathan wrote the whole analysis section based on Aarthi's analysis outputs. Pierre pointed out that looking at why the analysis wasn't working, GDP per capita couldn't be used as an outcome because no matter what weighting you use no combination could match London's, so employment rate has to be the outcome variable. Pierre wrote the Abstract and Introduction. Nathan wrote the conclusion.

A.1 AI Guideline

We haven't used AI tools to build the paper.