Digital Commons @ Assumption University

2018

The Super Bowl's Economic Impact on its Host City

Ashley Lockwood
Assumption College

Follow this and additional works at: https://digitalcommons.assumption.edu/honorstheses

Part of the Economics Commons, and the Sports Management Commons

Recommended Citation

The Super Bowl's Economic Impact on its Host City

By

Ashley Lockwood

Faculty Supervisor: Dr. Brian Volz

Economics and Global Studies Department

A Thesis Submitted to Fulfill the Requirements of the Honors Program at Assumption College

April 2018

Introduction

      Americans love to watch the Super Bowl. This mega-sporting event that airs once each year has generated over one hundred million viewers for the past eight consecutive years. No other television broadcast in America reaches as large of an audience as the Super Bowl (Nielsen). In the United States, cities and local governments battle for the privilege to be able to host the Super Bowl with the anticipation of their economy gaining massive benefits. Host cities of the Super Bowl spend an increased amount of money on infrastructure and security. These cities increase their expenditures in hopes of a great economic return. There is a general idea among the population that hosting the Super Bowl generates a massive revenue for the host economy. What I am seeking to answer in my research is if there is indeed a significant economic impact from hosting the Super Bowl on the local economy.

      The National Football League (NFL) hosts their championship differently than the Major League Baseball (MLB), National Hockey League (NHL), or National Basketball Association (NBA). For the MLB, NHL, and NBA their championships consist of multiple games, the first team to win four games in the best-of-seven game series will be named champion. Also in these three leagues, the games are held at the participating teams' stadiums, and they alternate between both teams' home stadiums. For the NFL, however, there is only one game played during the Super Bowl and the game is held at a neutral site predetermined years in advance by the NFL. Since there is only one game, this results in all of the excitement and preparation to celebrate the championship game being coordinated for one day. In a best-of-seven game series, it is undetermined when the series will end, so it is more difficult for people to plan to celebrate and watch a team be named champion. In order to become a host city for the big game, cities must

place a bid to the NFL and go through an extremely competitive selection process. Earning the opportunity to be the host city of the Super Bowl can create a massive sense of pride in a city; because of this, local residents typically support the game both emotionally and financially.

Hosting the game will cost the city millions of dollars in order to make necessary preparations. Before the game, infrastructure will have to be updated throughout the city because of the expected increase in traffic. Also, due to the fact that there will be thousands of people flooding the city, the city must increase security during the game and its events to ensure the well-being of the entire region. The NFL does not pay these costs to update infrastructure and increase security. The funding for these upgrades must come from an increase in local taxes (Matheson 2009). Increasing taxes is politically unpopular, so in order for the local government to gain support to have an NFL team, some benefit to the public must exist. Citizens may be discouraged from accepting higher tax rates if they are under the impression their city will not get a significant economic return. The desire for public support leads to local government officials and sports boosters' prediction that hosting the Super Bowl will generate hundreds of millions of dollars for the local economy (Sunnucks, 2015). Therefore, this high prediction suggests that if locals accept an increase in their taxes before the game, the money will come back into their economy after the game.

Due to the sports boosters' high predictions for the economic impact of hosting the Super Bowl, there is a common idea that the big game generates a massive positive impact on the host city's economy each year. By performing detailed regression analysis, economists began to research if hosting the big game did positively affect the local economy. Many economists have found contrary evidence suggesting that hosting the game may have little to no effect on the host's economy (Baade, Baumann, and Matheson 2009; Coates and Humphreys 2002; Matheson

2009; Baade and Matheson, 2006; Baade, Baumann, and Matheson, 2005). Sports boosters are typically not careful in distinguishing between money spent during the Super Bowl and money spent because of the Super Bowl. Economists specifically analyze the money spent because of the Super Bowl, and have found that the three main sources of sport boosters' bias in their estimations comes from not accounting for leakages, crowding out, and the substitution effect which are discussed in the next section. Taking these forms of bias into consideration leads to much lower estimates for the economic impact of the game. The variation in estimates has created a division between the opinions of the sports boosters and the economists.

In this paper, I am going to discuss the major differences between the sports boosters' pregame estimates compared to the economists' post game analysis. In my research, I analyze all 32 cities with an NFL team over the most recent 20 years to see if there is a significant impact on the host's economy. This research will show if increasing local taxes in order to host the game yields an increase in per capita GDP after the game. Tax payers accept higher tax rates under the impression that, after the game, their city will reap massive benefits from hosting the game. My results will either justify the increase in taxes for local citizens, suggest that citizens have no reason to accept a higher tax rate, or show that there is more research that needs to be done on this topic.

Literature Review

The Super Bowl is the most watched sporting event of the year, for this game is a staple in America's sport culture. Since the big game is held at a neutral site rather than at the home stadium of one of the participating teams, host cities must undergo an extremely competitive bidding process in order to earn the privilege of hosting the Super Bowl. The National Football League (NFL) chooses the host city years in advance, and the city must fulfill many requirements that the NFL sets, such as having a minimum of 70,000 seats, a sufficient number of luxury boxes, and plenty of hotel rooms in the city (Schimmel, 2006). Although many cities battle each year to host the game, the reward also involves paying millions of dollars to prepare for the mega-sporting event in hopes that the economic benefit afterwards will outweigh the costs. There are many disagreements between boosters of the Super Bowl and sports economists not affiliated with promoting the game concerning the significance of the economic impact of hosting the game. Many economists sponsored by the NFL or the Super Bowl Host Committee each year suggest that there is a large economic benefit associated with being the host city. Comparatively, economists who have no incentive to boost the benefits of the game find much less of an economic benefit, if any benefit whatsoever, to hosting the game.

A city often relies heavily on local taxpayers in order to provide financial support to host the Super Bowl. Local citizens will see their taxes increase in order to pay for the increased security, updated infrastructure, and other expenditures required to host the game (Matheson, 2009). For example, in 2016, Super Bowl L held in the San Francisco Bay Area cost taxpayers almost $5 million in taxes, and the city was only reimbursed $104,000 by the host committee (Campbell, 2016). The local government justifies higher taxes to its citizens by appealing to the

economic benefit resulting from hosting the game, which will be much larger than the costs.

Cities do not only have to pay for hosting the Super Bowl, but oftentimes they must have a newly renovated or constructed stadium that meets NFL requirements. Fourteen of the last seventeen Super Bowls held between 2001 and 2017 have been hosted in stadiums less than 10 years old (Coates and Matheson, 2011). Stadiums cost hundreds of millions of dollars, and some of the funding for these massive structures comes from the team's franchise, but the citizens end up paying a majority of the cost through their taxes (Baade, Baumann, and Matheson, 2005). The high cost of having an NFL team in a city can be unattractive to citizens, which creates the incentive for sports boosters and local government officials to overestimate the economic benefit the team will offer to the city.

Sports Boosters' Predictions

Prior to the game the NFL will make predictions for the economic benefit of hosting the game, and their estimates have been extremely high, implying that the host city will experience hundreds of millions of dollars flooding the local economy. For example, in a study commissioned by the Houston Super Bowl Host Committee, Super Bowl LI held in Houston was predicted to generate over $400 million for the local economy (Houston Super Bowl Host Committee 2016). Also, the Arizona Super Bowl Host Committee predicted in 2015 Super Bowl XLIX was going to generate a $600 million economic impact (Sunnucks, 2015). After the game, a study from the economists at Arizona State University's W.P. Carey School of Business claimed that Super Bowl XLIX generated $719 million in total economic impact for the greater Phoenix area. This study was commissioned by the Arizona Commerce Authority and was released to the public by the host committee (Corbett, 2015). Sports boosters have the incentive

6

to offer high estimates in order to maintain the public support of having an NFL team and hosting the Super Bowl. These predictions from the Houston and Arizona host committees were created to reassure the local citizens that after they pay higher taxes and experience increased traffic in their area they will be rewarded with an economic benefit. Host cities have continuously predicted estimates into the hundreds of millions of dollars. Super Bowl XLVIII predicted $550 million to flood the economy (Bloomberg News, 2013).

The economic impact predictions made by the NFL and promoters estimate the number of tourists expected to come to the city, how long each visitor will stay, and how much money each guest will spend each day. All of these numbers are multiplied together to evaluate their direct economic impact estimate. This number then is almost doubled by the multiplier effect, which accounts for the direct spending being spent again by the local businesses that would have received the direct impact (Coates and Humphreys, 2002). The additional spending accounted for in the multiplier effect, the indirect spending, doubles the estimated direct impact, thus doubling the total economic impact estimate. Boosters must estimate the number of expected tourists. Boosters are extremely optimistic about how many people will be coming to the host city and how much they will be willing to spend each day. The boosters overestimate the number of visitors in order to create an image of massive celebration in the city (Baade, Baumann, and Matheson, 2005). While the Super Bowl sells out quickly every year, visitors who are not attended the actual Super Bowl still travel into the city to celebrate and the variety of events held in the city in honor of the game. If people believed that not a lot of others were going to the game, they would be more hesitant to shell out a lot of money to attend a vacant party. This leads to boosters having a strong incentive to overestimate these numbers, leading to a higher pregame prediction.

Predicting the amount of actual sales that will occur in the future, after the Super Bowl, is a nearly impossible task. Three major theoretical deficiencies in making pregame predictions include the substitution effect, crowding out, and leakages. The substitution effect happens when visitors are indeed spending more on the sporting event, but this new spending occurs instead of spending that would typically go to local shops and restaurants (Baade, Baumann, and Matheson, 2005). The substitution effect holds true only for local citizens who would typically spend money at their local stores, but due to the Super Bowl being in their city they will budget their money differently to be able to spend more at the game rather than local shops (Matheson, 2009). Therefore, the spending by local citizens is not a new economic benefit, but instead it is money being spent in a different area of the same local economy. However, the Super Bowl is a mega sporting event and attracts fans from all over the country, not solely fans living in the local metropolitan area. Therefore, economists must use caution when estimating how much spending is from local citizens.

Not all local citizens are interested in the Super Bowl, and the game also can deter vacationers from visiting the city during such a busy week. Crowding out occurs when local citizens leave the host city area and potential vacationers do not visit, and thus do not spend money in their local economy, because they do not want the hassle of dealing with the increased traffic and visitors (Matheson, 2009). Money that otherwise would have been spent in the local economy if the game were not taking place, is no longer being spent due to the inconvenience of traffic for the locals (Baade, Baumann, and Matheson, 2005). The Super Bowl oftentimes is held in a warm weather city that is a vacation spot for tourists whether or not the game is being held. So if a city's hotels are usually full with vacationers but during the Super Bowl week their hotels

are instead filled with football fans, then this is not new spending. The sports fans are simply replacing the vacationers that would usually be visiting the city anyways.

Although local tax payers experience increased taxes to pay for the game to be held in their city, not all of the money spent because of the game stays in the local economy. Leakages include money that is spent in the host city that goes to national companies, and therefore does not benefit the local economy (Baade, Baumann, and Matheson, 2005). An example of a leakage would be how during the week of the Super Bowl, hotels increase their rates by three or four times more than what they usually are, but the workers at the hotel do not see an increase in their income during that week. Therefore, the additional money the hotel is generating does not benefit the local citizens who work in the hotel, but instead the money is benefitting the shareholders of the hotel (Matheson, 2009).

Economists' Analysis

Many economists have run regressions to see if hosting the Super Bowl has any significant economic impact on the host city. Economists who have performed an extensive amount of research in this area of sports economics include, Victor Matheson, Dennis Coates, and Robert Baade, as well as many others. These three economists each have written many scholarly articles, both independently and collaboratively (Baade, Baumann, and Matheson 2009; Coates and Humphreys 2002; Matheson 2009; Baade and Matheson, 2006; Baade, Baumann, and Matheson, 2005). Over the years they have made modifications and adjustments to the models they created in previous articles in order to have the most accurate estimation of the economic impact of the Super Bowl. Economists generally did not analyze the economic impact of the Super Bowl until these three began performing elaborate research on the topic.

Many sports boosters who are either affiliated with the NFL or the local government of the host city offer much larger economic benefit results when compared to economists not promoting the event. Economists account for the substitution effect, leakages, and crowding out when they generate their estimates of the economic impact of the Super Bowl. The substitution effect causes economists to not include spending by local citizens in their estimates (Baade, Baumann, and Matheson, 2005). By doing so, economists are acknowledging that the money local citizens spent on the game would have been spent in the local economy regardless of the Super Bowl occurring. When taking into consideration the spending displaced by crowding out, economists must compare how full the city's hotel rooms typically are when the Super Bowl is not taking place to their capacity when the Super Bowl was taking place (Matheson, 2009). Economists are very specific with only including spending that occurs because of the Super Bowl and not assuming that all money spent within that week benefits the local economy.

Sports boosters do not only claim that the Super Bowl host city will experience an economic benefit during the week of the game, but that the city will also experience an increase in tourism to the area. Thus the boosters are claiming that the economic benefit of hosting the game will continue to grow, leading to even more money in the economy in the future. There is no objective evidence, however, to conclude that tourism does indeed increase in the long run (Coates and Matheson, 2011). Many of the cities where the Super Bowl is hosted are already attractive vacation destinations for tourists, therefore hosting the game ends up having no significant effect on the tourism rates in the future (Matheson, 2009).

In order to verify that hosting the game has any impact on the economy of the host city, economists must gather years of data from cities that have NFL teams. This type of regression analysis that involves examining many cities over different periods of time is called panel data

analysis. Panel data is a combination of cross-sectional data and time series data, and there are various models that estimate panel data. These models include the pooled ordinary least squares (OLS), the fixed effects, and the random effects models. There are tests such as the Hausman test and the Breusch-Pagan test that can be executed to decide which model is the best fit for the data (Coates and Humphreys, 2002).

Coates and Humphreys (2002) as well as Matheson (2005) found the fixed effects model to fit their data the best. The fixed effects model specifically measures how the dependent variables effect the independent variable within each city over time, instead of measuring how variables from one city could affect another city's variables. Coates and Humphreys analyzed the determinants of Per Capita Income from 1969-1997 of all cities with an NFL team to see if hosting the Super Bowl had an effect on the host city. They used many variables that contribute to Per Capita Income in a host city such as Population, Income, Wages, Tech Booms, and Oil Booms (Coates and Humphreys, 2002; Matheson, 2005). They also used a dummy variable to account for if the city hosted the Super Bowl that year. They also ran the regression both with and without lagging the independent variables. By lagging the independent variables by one year, the regression results will show if any of the independent variables, including the dummy variable for hosting the Super Bowl, have a significant impact on Per Capita Income increasing in the future. They concluded that hosting the Super Bowl had no measurable impact on Real Per Capita Income in the host city, because the parameter on the dummy variable for hosting the Super Bowl was not statistically significant (Coates and Humphreys, 2002). They claimed that although the host city did not experience a significant economic benefit, another dummy variable for the winning city was significant. This meant they found that winning the Super Bowl had a

11

significant economic impact on the local economy of the winning city (Coates and Humphreys, 2002).

Matheson (2005) performed a near identical regression to Coates and Humphreys (2002) using Per Capita Income as the dependent variable and using the fixed effects model. Matheson, however, included additional independent variables that also could have an effect on Per Capita Income to test if winning the Super Bowl did have a significant economic impact on the winning city. These additional variables included the tech booms, oil booms, and income. With the inclusion of these new variables, Matheson found contrary evidence to the study performed by Coates and Humphreys (2002) concluding that he did not find there to be a significant economic impact in the winning city of the Super Bowl. This proves how the variables included (or excluded) in the regression can alter the conclusions completely, and shows that there is disagreement on whether winning the Super Bowl positively impacts the team's home city.

Non-monetary benefits also exist for the host city of the Super Bowl, and these incentives may outweigh the economic benefits in the eyes of the local government officials and local citizens. An example of a non-monetary benefit is the sense of pride a city feels when it is awarded the title of host city. Local government officials suggest that hosting a mega-sporting event increases the quality of living for the local citizens, by providing them with an opportunity not experienced by many people (Coates and Matheson, 2011). Also, by successfully hosting the big game cities attract other major events in the future. Not every city with an NFL team is able to host the Super Bowl, so once a city earns a bid to become the host city one time then they are more likely to get selected to host again in the future (Coates and Matheson, 2011).

The pregame estimates from boosters into the hundreds of millions of dollars have been found to be greatly overestimated by many economists. Hosting the Super Bowl is equally as

likely to cause a negative impact on the economy as it is to generate a positive impact (Baade, Baumann, and Matheson 2009; Coates and Humphreys 2002; Matheson 2009). Yet sports boosters continue to make extremely high predictions for the Super Bowl payoff for the host city, and local governments are still capable of convincing their citizens to financially support hosting the big game by accepting higher tax rates. Thus, economists have found no evidence to justify the local citizens accepting higher tax rates in order to have an NFL stadium and host the Super Bowl. By using more current data, I will perform my own regression analysis about the economic significance of hosting the Super Bowl. The data I will be using is from the most recent fifteen years of accessible data. Current available studies have not performed regression analysis with data after the year 2005, so my dataset will include over a decade of new data. Using newer data, I may get different results from previous economic studies.

Description of Data

   In this model nine variables are included, one dependent variable and eight independent variables. Sixteen years of data from 2002 to 2016 was collected for all nine variables, but all variables were converted to percent change from one year ago resulting in having fifteen years of usable data. Since I want to model the effect of hosting the Super Bowl on the local economy, the dependent variable is Per Capita Real Gross Domestic Product (RGDP) by metropolitan area to represent the status of the economy. Per Capita RGDP is measured in dollars and is the inflation-adjusted measure of all goods and services produced in the metropolitan area, which is then divided by the area's population. Per Capita RGDP by metropolitan area is released annually by the U.S. Bureau of Economic Analysis and is additionally made available on the Federal Reserve Economic Data (FRED) St. Louis Fed website.

  The purpose of this study is to see if hosting the Super Bowl has any economic impact on the host city, therefore the Hosting variable is the main independent variable of interest in my regression analysis. The Hosting variable is a qualitative variable representing whether or not the city hosted the Super Bowl that year. In order to include a qualitative variable in my regression I used a dummy variable to quantify the data. A dummy variable is set to equal 0 or 1 to signal the absence or presence of a qualitative variable. The variable equals 1 if the city did host the game that year and 0 otherwise. I predict that hosting the Super Bowl will have an inverse relationship with per capita RGDP. I believe that the costs for hosting the game exceed the amount of revenue the city generates, because a lot of the revenue from the game benefits the NFL rather than the city directly (Baade, Baumann, and Matheson, 2005).

Which teams played in the game and which team won the game are two additional dummy variables included in the regression. Cities whose team played in the Super Bowl each year are assigned the value of 1, and if the city's team did not appear in the game that year the variable is assigned the value of 0. Similarly, if a city's team won the Super Bowl then the variable was set to equal 1, and 0 if the city's team did not win or did not participate. I predict that winning or playing in the Super Bowl will not have any impact on per capita RGDP. I do not expect travel to increase to either participating city, and residents of that city will not be able to increase spending without an increase in income. Information about where the Super Bowl was hosted, which teams played, and which team won are all available on the NFL website.

The remainder of the independent variables included are additional factors that influence Per Capita RGDP, which are not related to participating in the Super Bowl. These variables are Population Growth Rate, Tourism Rates, U.S. RGDP, and U.S. Real Disposable Personal Income Per Capita. Population estimates for all cities across the U.S. are produced during July of each year by the U.S. Census Bureau. The population estimates were converted into percent change from one year ago to account for the varying population sizes throughout the cities with NFL teams. I predict that the Population Growth Rate will have an inverse relationship with Per Capita RGDP. Since RGDP is measured on a per capita basis in this regression, an increase in the population would mean the RGDP of that metropolitan area would be divided by a larger number of people. I do not think that individual people contribute to RGDP enough to account for the shrinking of Per Capita RGDP that occurs from having to divide a similar amount of RGDP among more people.

Tourism Rates are not available on the metropolitan area level, so to represent Tourism I instead collected the amount of leisure and hospitality jobs in each metropolitan area. If there

was an increase in tourism to the area, then there would be an increased demand for leisure and hospitality jobs to meet the needs of the travel into the area. The number of leisure and hospitality jobs in each metropolitan area is available on the U.S. Bureau of Labor Statistics website. I predict that as the number of leisure and hospitality jobs increases, then per capita RGDP will also increase. Additional spending in the area will increase the amount of goods and services produced which would lead to an increase in RGDP.

U.S. RGDP and U.S. Real Disposable Personal Income Per Capita are two independent variables that I included to account for the overall status of the U.S. economy. If the economy of the U.S. as a whole is underperforming, then it is expected that each of the metropolitan areas would also experience an economic decline. For this reason, I expect both U.S. RGDP and U.S. Real Disposable Income to have a direct relationship with per capita RGDP of the metropolitan areas. The U.S. Bureau of Economic Analysis provides annual data for both of these variables. The data is made easily accessible on the FRED website.

To account for potential multicollinearity, I first tested the Variance Inflation Factor (VIF) of all the independent variables. The VIF measures how much the variance of the estimated coefficient is being inflated by multicollinearity. Typically, if a VIF is greater than 10, then it would be considered to suffer from multicollinearity. All of the independent variables in this regression had VIFs less than 10 which is a positive indicator that multicollinearity is not an issue. However, even though the VIF test came back showing no concerns for multicollinearity, another concern for the independent variables I have included is that some of the effects of hosting the Super Bowl could have been accounted for in the Tourism variable. This would be an issue, for instance, if hosting the game has a positive relationship with Tourism, then an increase in Tourism also increases Per Capita RGDP. This would cause the interpretation of

16

both variables to be inaccurate, because of endogeneity. To account for this possibility, I ran two

regressions with Tourism as the dependent variable and Per Capita RGDP, Hosted, Played, Won,

Population Growth Rate, U.S. RGDP, and U.S. Real Disposable Personal Income per capita as

the independent variables. In the first regression, I ran a fixed effects model and looked to see if

the hosted variable had any significant effect on tourism. The results from Stata are:

Table 1:

Fixed Effects Estimator		
Dependent Variable: Tourism		
Variable	Coefficient	P-value
Hosted	**0.5063364**	**0.291**
Per Capita RGDP	0.1712485	0.000
Played	0.0950147	0.843
Won	-0.0380045	0.954
Population Growth Rate	0.398155	0.000
U.S. RGDP	0.7202831	0.000
U.S. Income	-0.0907733	0.169
Constant	0.4266807	0.002

Since the p-value on the Hosted variable is insignificant at the 10% level with a p-value of 0.291,

then hosting has no significant effect on Tourism in this model. The second regression I ran

included the same variables, but the Hosted variable was lagged by one year to see if the Hosted

variable has an effect on Tourism the year after hosting the Super Bowl. The results from this

second regression are:

Table 2:

Fixed Effects Estimator		
Dependent Variable: Tourism		
Variable	Coefficient	P-value
Hosted (1 Year Lag)	**-0.4041218**	**0.418**
Per Capita RGDP	0.1618317	0.000
Played	-0.0415784	0.934
Won	0.0461775	0.946
Population Growth Rate	0.392623	0.000
U.S. RGDP	0.7021132	0.000
U.S. Income	-0.047935	0.475
Constant	0.5237002	0.000

With a p-value of 0.418 the Hosted variable is insignificant, so hosting the Super Bowl does not have a significant effect on Tourism the following year. Since, in both models the Hosting variable has no significant effect on Tourism, then the two variables do not suffer from endogeneity. Therefore, I can proceed with including both variables as independent variables in my regressions against Per Capita RGDP.

Not all variables I wished to include in my regression were possible to find at the metropolitan level. The education level of a city is an important indicator of how productive the city can be. I predict the level of education in a metropolitan area would positively affect per capita RGDP, but high school graduation rates or dropout rates for metropolitan areas are not readily available to find. High school graduation rates are available at the state level, but it is not safe to assume that a metropolitan area has the same graduation rate as the state average. Not being able to include high school graduation rates is not detrimental to the regression, because high school graduation rates do not typically change drastically every year. Since the rates will be relatively similar each year within each metropolitan area, then differences between areas will be accounted for in both, the fixed effects and random effects, models.

Stadium Capacity is another variable which will not be included in my final regressions. While I was able to find the stadium capacity for each NFL team's home stadium, since the variable remains mostly constant for each city it is not logical to include in either a fixed effects or random effects model. The purpose of using a fixed effects or random effects model is to analyze the relationship between dependent and independent variables within an entity that vary over time, so both models control for individual characteristics. To see if Stadium Capacity did have any effect on Per Capita RGDP that would not be captured in either of the two models, I ran a pooled ordinary least squares (OLS) estimate.

The results from this pooled OLS regression are:

Table 3:

Pooled OLS Estimator		
Dependent Variable: Per Capita RGDP		
Variable	Coefficient	P-value
Stadium Capacity	**7.49E-06**	**0.647**
Hosted	-0.6082089	0.280
Played	0.4472508	0.428
Won	-0.0358163	0.964
Population Growth Rate	-0.3309687	0.000
U.S. RGDP	0.7105981	0.000
U.S. Income	0.1056274	0.187
Tourism	0.2530943	0.000
Constant	-1.609618	0.164

Looking at the Stadium Capacity variable, the coefficient is near zero and is insignificant with a p-value of 0.647. Therefore, stadium capacity has no significant effect on per capita RGDP, and my final regressions are thus not effected by lacking the stadium capacity variable.

Description of Model

        Panel data analysis is used to model the effects of hosting the Super Bowl on Per Capita

RGDP from 2001-2016. Since all variables are measured in percent change from one year ago,

the 16 years of data amounts to 15 observations for most cities. The only gap in all of the

variables for any year, is that per capita RGDP was not available for the Boston metropolitan

area for 2016. For all 32 cities there are 15 observations except for Boston which has 14

observations, so in total this model includes 479 observations.   Since there is only one

observation missing, having gaps in the dataset is not a concern for this model. Both the fixed

effects model and the random effects model are used to regress this dataset, and the results are

compared.

        The fixed effects model is used to analyze the impact of variables that change over time

within an entity. For this model, the entities are the metropolitan areas, and the model will be

testing the effects of the independent variables on Per Capita RGDP for each metropolitan area.

Each metropolitan area has individual characteristics that may or may not affect Per Capita

RGDP, and the fixed effects model controls for these individual characteristics. The fixed

effects model assumes that the differences between entities are constant.

        The biggest difference between the fixed effects model and the random effects model is

that the random effects model assumes that variation between metropolitan areas is random

rather than constant. The random effects model is used if the differences across entities are

believed to have some influence on the dependent variable. Since I am not confident that the

differences between metropolitan areas have influence on Per Capita RGDP, both models are

used to ensure the most accurate results.

For both the fixed effects and random effect model, I ran a regression with the independent variables lagged by one year and not lagged. The purpose of lagging the independent variables is to see if the independent variables have an effect on the following year's Per Capita RGDP. The effects of hosting the Super Bowl may not be seen until the following year if the city being televised is what attracts more people to spend additional money in the city. Claiming that hosting the Super Bowl will improve the local economy in the future is an argument sports boosters make to justify hosting the game. Therefore, by lagging the independent variables I will be able to see if their justification holds any truth.

When using cross-sectional data, heteroscedasticity can be an issue due to the fact that there is a larger amount of variability in cross-sectional data compared to time series data. Panel data is a combination of cross-sectional data and time series data, so the concerns with cross-sectional data can also affect panel data. To correct for possible heteroscedasticity, I ran robust regressions in both the fixed effects and random effects models. By running robust regressions, I am minimizing the issue of outliers in my regressions. Robust regression weighs observations based on how well behaved the observations are, which causes outliers to have less impact on the estimates of regression coefficients. Hence, robust regression generally will produce different coefficient estimates than a typical regression.

Since all variables are measured in percent change, then all of the coefficients on each characteristic should also be interpreted as an increase or decrease in percent change. A significant coefficient means that the presence of that variable affects Per Capita RGDP, by either having a direct or inverse relationship. When interpreting the three dummy variables (Hosted, Played, and Won), those coefficients represent the effect on per capita RGDP if the city did host, play, or win the Super Bowl since the variable is set to equal 1 for all three cases.

21

The Hosting variable is the main variable of interest in my analysis. If the variable has a significant and positive effect on Per Capita RGDP, then this analysis will support the sports boosters' predictions that hosting the Super Bowl brings a large amount of money into the local economy. Conversely, if the variable is insignificant or significant and negative, then the results will support the economics' analysis stating that hosting the big game does not bring a drastic revenue into the economy. In addition to the sign of the coefficient being important, the size is also important because if the coefficient is close to zero, then there would be a zero percent change in Per Capita RGDP from hosting the Super Bowl.

Results

        The results from the fixed effects models and random effects models are described and compared. Two fixed effected regressions are analyzed, one with the independent variables lagged by one year and one without the lag. Similarly, two random effects regressions have been performed with and without lagging the independent variables by one year. In all of the regressions, the dependent variable is Per Capita RGPD and all independent variables are included.

        The first regression is the fixed effects estimator without lagging the independent variables, and the results are shown below:

Table 4:

Fixed Effects Estimator		
Dependent Variable: Per Capita RGDP		
Variable	Coefficient	P-value
Hosted	**-0.5176997**	**0.549**
Played	0.2712514	0.458
Won	-0.0466565	0.910
Population Growth Rate	-0.3377493	0.000
Tourism	0.2594078	0.003
U.S. RGDP	0.7035202	0.000
U.S. Income	0.1032003	0.231
Constant	-1.074287	0.000

The variable that represents whether or not the city hosted the Super Bowl is insignificant at any acceptable level of significance. Therefore, no conclusion can be made from this regression stating that hosting the game effects the local economy either positively or negatively from 2001-2016. The variables representing if a city's team played in the game or won the Super Bowl also are insignificant at all levels of significance. Therefore, all dummy variables that represent some

aspect of a city being involved in the Super Bowl are insignificant. The other insignificant variable in this regression is U.S. Income.

The variables that are significant in this fixed effects estimator are Population Growth Rate, Tourism, and U.S. RGDP. Additionally, all three variables are significant at the 1 percent level. As predicted, as the Population Growth Rate increases, Per Capita RGDP decreases because a similar amount of RGDP is being divided among a larger population. Therefore, as Population increases by 1 percentage point, holding all other variables constant, Per Capita RGDP decreases by 0.338 percentage points. Tourism has a positive effect on per capita RGDP, as previously predicted. As Tourism increases by 1 percentage point, holding all other variables constant, Per Capita RGDP increases by 0.259 percentage points. As more people are traveling into the city, then more money will be spent in the city which will allow to city to produce more and thus increase Per Capita RGDP. U.S. RGDP is significant and has a positive coefficient, because logically if the nation as a whole is increasing RGDP then the metropolitan areas must also see an increase in RGDP. As U.S. RGDP increases by 1 percentage point, holding all other variables constant, Per Capita RGDP of the metropolitan areas increases by 0.704 percentage points.

The R squared of the fixed effects estimator is 0.4470; therefore, 44.7 percent of the variation of Per Capita RGDP is explained by the variation in the independent variables. Also, the F statistic is significant at the 1 percent level, which means that at least one coefficient in this model is significantly different from zero.

The fixed effects model with the independent variables lagged by one year shows slightly different results compared to the fixed effects regression without lagging the independent variables:

Table 5:

Fixed Effects Estimator		
Dependent Variable: Per Capita RGDP		
Independent Variables Lagged by One Year		
Variable	Coefficient	P-value
Hosted	**-0.1940919**	**0.886**
Played	0.1578522	0.857
Won	-0.7819752	0.533
Population Growth Rate	0.136053	0.242
Tourism	-0.2264289	0.343
U.S. RGDP	0.8124158	0.005
U.S. Income	-0.196069	0.036
Constant	-0.1398827	0.488

The three dummy variables for Hosting, Playing, and Winning the Super Bowl remain insignificant at any acceptable level. In the previous fixed effects estimator, U.S. Income was insignificant at all levels, but when the independent variables are lagged by one year the variable becomes significant at the 5 percent level with a negative coefficient. I originally predicted U.S. Income would have a positive coefficient, because I believed if U.S. Income increased one year then people would be able to spend more the following year. Thus, the increased spending would translate into increased per capita RGDP. However, this negative coefficient means that as U.S. Income increases by 1 percentage point, holding all other variables constant, per capita RGDP of the metropolitan areas decreases by 0.226 percentage points the following year.

In the fixed effects model without the lagged independent variables the Tourism and Population variables were both significant at the 1 percent level, and in this model, they are not significant at any level. Therefore, neither Tourism or Population significantly effects Per Capita RGDP the following year. The variable for U.S. RGDP remains significant at the 1 percent level with a positive coefficient. This displays how an increase in U.S. RGDP in the current year will increase Per Capita RGDP of the metropolitan areas in the following year. Therefore, as the U.S.

RGDP increase by 1 percentage point, holding all other variables constant, Per Capita RGDP increases by 0.812 percentage points the following year.

The F statistic for this fixed effects estimator with the independent variables lagged by one year is significant at the 1 percent level. Therefore, at least one coefficient in this model is significantly different from zero. The R squared for this model is 0.0994, so 9.94 percent of the variation of per capita RGDP is explained by the variation in the independent variables.

The next estimation is the random effects model, without the lag on the independent variables, and the results are very similar to the results of the fixed effects estimator without the lag:

Table 6:

Random Effects Estimator		
Dependent Variable: Per Capita RGDP		
Variable	Coefficient	P-value
Hosted	**-0.6132508**	**0.450**
Played	0.4343666	0.203
Won	-0.0207516	0.961
Population Growth Rate	-0.3312919	0.000
Tourism	0.2554197	0.000
U.S. RGDP	0.7088321	0.000
U.S. Income	0.1047993	0.230
Constant	-1.085452	0.000

As seen in both previous models, the three dummy variables representing hosting, playing, or winning the Super Bowl remain all insignificant. U.S. Real Disposable Income Per Capita is also insignificant as seen in the fixed effects model without the lag on the independent variables. The three independent variables remaining are significant at the 1 percent level and include Population Growth Rate, Tourism, and U.S. RGDP. As predicted, Population Growth Rate has a negative coefficient, Tourism has a positive coefficient, and U.S. RGDP also has a positive coefficient. As Population increases by 1 percentage point, holding all other variables constant,

Per Capita RGDP decreases by 0.331 percentage points. While Tourism increases by 1 percentage point, holding all other variables constant, Per Capita RGDP increases by 0.255 percentage points. Lastly, as U.S. RGDP increases by 1 percentage point, holding all other variables constant, Per Capita RGP increases by 0.709 percentage points.

The F statistic for this model is significant at the 1 percent level, so at least one coefficient in this model is significantly different from zero. The R squared for this random effects model is equal to 0.4473, which means 44.73% of the variation in per capita RGDP is explained by the variation in the independent variables.

When lagging the independent variables by one year, the random effects model shows similar results seen in the fixed effects model with the same lag:

Table 7:

Random Effects Estimator		
Dependent Variable: Per Capita RGDP		
Independent Variables Lagged by One Year		
Variable	Coefficient	P-value
Hosted	**-0.5317624**	**0.671**
Played	0.3398763	0.671
Won	-0.6985093	0.577
Population Growth Rate	0.1168737	0.277
Tourism	-0.1904117	0.364
U.S. RGDP	0.7785411	0.002
U.S. Income	-0.193312	0.034
Constant	-0.1424832	0.508

The dummy variables representing whether or not the city Hosted, Played, or Won the Super Bowl, are insignificant at any acceptable level of significance. These three dummy variables have remained insignificant throughout all four models. The variables for Population and Tourism are also insignificant at any acceptable level, but these two variables were previously

significant at the 1 percent level in the random effects estimator without the lagged independent variables.

The variable for U.S. Real Disposable Income Per Capita is significant at the 5 percent level with a negative coefficient. In the fixed effects model with the lagged independent variables U.S. Income was also significant at the 5 percent level with a negative coefficient. In the random effects estimator without the lagged independent variables, U.S. Real Disposable Income Per Capita was not significant at any level. While the negative coefficient was not predicted, it means that as U.S. Income increases by 1 percentage point, holding all other variables constant, Per Capita RGDP decreases by 0.193 percentage points the following year. The U.S. RGDP variable is significant at the 1 percent level, and has a positive coefficient as also seen in the fixed effects model with the lag on the independent variables. As the U.S. RGDP increases by 1 percentage point, holding all other variables constant, Per Capita RGDP of the metropolitan area increases by 0.779 percentage points the following year.

The F statistic for this random effects model with the independent variables lagged by one year is significant at the 1 percent level. Therefore, the model has at least one coefficient that is significantly different from zero. The R squared of this model is 0.1006, which signifies that 10.06% of the variation in Per Capita RGDP is explained by the variation in the independent variables.

Conclusion

In the media, hosting the Super Bowl appears to be a privilege for the city that wins the bid from the NFL. While sports boosters promise a substantial boost to the local economy, other economists have failed to find evidence of this boost. Citizens of the cities with NFL teams must pay an increased amount of taxes in order to build stadiums, update infrastructure, and increase security around the event. An analysis of Per Capita RGDP in a panel of American metropolitan areas from 2001-2016 fails to find a consistent impact of hosting the Super Bowl on Per Capita RGDP. Since the fixed effects models and the random effects models show similar results I am indifferent between selecting which model best represents the data. My theoretical prediction is that hosting the Super Bowl has a negative effect on the local economy, because of the increased taxation and spending in preparation for the event being more substantial than the revenue gained. I have not found evidence to support the idea that hosting the Super Bowl benefits the city. While I did not find any significance to hosting the Super Bowl, the coefficient on Hosting was negative in all four models, therefore Hosting would have negatively affected the host city's economy by decreasing Per Capita RGDP the following year.

Although, economically speaking there was no benefit found that comes from hosting the Super Bowl, that is not to say there are not other benefits from hosting the game that are immeasurable. Factors such as increasing the quality of life of the residents of the host city, overall happiness, and pride for one's city cannot be quantified. The fact that they cannot be quantified does not diminish their importance, but rather could provide a possible explanation as to why cities continue to compete to host the Super Bowl. Having an NFL team in a city can provide a sense of comradery to its citizens, which can increase the quality of life for that city.

Sports boosters would agree that these immeasurable factors make hosting the Super Bowl worthwhile.

Additionally, my research only measures the formal economy that contributes to Per Capita RGDP of a metropolitan area. Citizens of the host city could rent out their homes or charge for private parking on their properties in an attempt to earn additional income. These sources of additional income for individuals would not be accounted for in Per Capita RGDP, but this informal economy could be a benefit to the citizens of the host city. One could argue that if citizens saw a significant increase in their income because of the informal economy associated with hosting the Super Bowl, then the citizens would spend more money after the Super Bowl thus increasing Per Capita RGDP.

While I did not find any significance in hosting the Super Bowl, I found contrary evidence to Coates and Humphreys (2002) research about the significance of winning the Super Bowl. They claimed in their regression to find that winning the Super Bowl provided a positive impact to the team's local economy. However, in all four of my regressions I found the dummy variable that represents if the team won the Super Bowl to have an insignificant effect on per capita RGDP of the metropolitan area. The difference in results could be caused by our dependent variables representing the economy being different. In my regression I used Per Capita RGDP, and in their regression Coates and Humphreys used Per Capita Income as their dependent variable. Another source of the different results could be that their study is based on data from 1969 to 1997, whereas my data is more recent. It is possible that winning the Super Bowl used to have a positive impact on the local economy, and in more recent years there is no significant effect on the team's local economy.

Theoretically, there is a concern that if hosting the Super Bowl increases Tourism, and Tourism increases Per Capita RGDP then, by transitivity, hosting the game would increase RGDP. After testing for endogeneity, I found that hosting has no significant effect on tourism, so this concern is not an issue for this model. Many of the cities that have NFL teams are already tourist destinations, and they attract many visitors regardless of where the Super Bowl is hosted. Therefore, people who are traveling to the city in order to attend the Super Bowl and its week-long events are simply displacing the visitors who would come to the city regardless of the game. This is a possible explanation for why hosting the Super Bowl had no effect on tourism.

Football is a sport unique to Americans and unites us as a nation every year as the Super Bowl captures over one hundred million viewers (Nielsen). While there is no economic evidence supporting the increase in taxation of local residents to support hosting the Super Bowl, this game is a massive part of American culture. I do not predict cities will ever want to stop hosting the Super Bowl unless circumstances for hosting became drastically worse. However, I must agree with the economists mentioned in the literature review that sports boosters greatly overestimate the revenue generated by hosting the game. If such revenues existed after hosting the Super Bowl, an increase in Per Capita RGPD of the metropolitan area would likely be observed either the year of or the year after hosting the game.

Works Cited

Baade, Robert and Baumann, Robert and Matheson, Victor. "Selling the Big Game:

    Estimating the Economic Impact of Mega-Events through Taxable Sales." *Economics*

    Department Working Papers Paper 83 (2005): 3-19.

    http://crossworks.holycross.edu/cgi/viewcontent.cgi?article=1082&context=econ_workin

    g_papers.

Baade, Robert and Matheson, Victor. "Have Public Finance Principles Been Shut Out

    in Financing New Stadiums for the NFL?" *Public Finance and Management* (2006):

    284-320.

Bloomberg News. "Flashy N.Y. fanfare steals Super Bowl spotlight, and revenue, from N.J."

    NJ.com. (November 25, 2013). http://www.nj.com/super-

    bowl/index.ssf/2013/11/flashy_ny_fanfare_steals_super_bowl_spotlight_and_revenue_fr

    om_nj.html.

Campbell, Severin. Report to Supervisor Avalos from *City and County of San Francisco,*

    Board of Supervisors, Budget and Legislative Analyst. (January 15, 2016).

    http://sfbos.org/sites/default/files/FileCenter/Documents/54799-

    011516%20City%20Expenditures%20for%20Super%20Bowl%2050.pdf

Coates, Dennis and Humphreys, Brad. "The Economic Impact of Postseason Play in

    Professional Sports." *Journal of Sports Economics* Vol. 3 No. 3. (August 2002): 291-299.

    DOI: 10.1177/1527002502003003005.

Coates, Dennis, and Matheson, Victor. "Mega-events and housing costs: raising the rent

    while raising the roof?" *The Annals of Regional Science* 46, no. 1 (February 2011): 119-

    37. DOI:10.1007/s00168-009-0340-5.

Corbett, Peter. "Report: Super Bowl Lifted Valley Economy by $720 Million." *Azcentral*. The

    Arizona Republic, (June 2015). Web.

    http://www.azcentral.com/story/news/local/glendale/2015/06/23/super-bowl-valley-

    economic-impact/29193319/.

Houston Super Bowl Host Committee. (2016). http://www.housuperbowl.com/host-

    committee.

Matheson, Victor. "Contrary Evidence on the Economic Effect of the Super Bowl on the

    Victorious City." *Journal of Sports Economics* Vol. 6 No. 4. (November 2005): 420-428.

    DOI: 10.1177/1527002504267489.

Matheson, Victor. "Economics of the Super Bowl." *College of the Holy Cross Department of*

    Economics Faculty Research Series Paper No. 09-14. (December 2009).

    http://college.holycross.edu/RePEc/hcx/Matheson_SuperBowl09.pdf.

Rabinowitz, Allen. "The Economics of the Game: Super Bowl." *Georgia Trend* 9.4 (1993).

Schimmel, Kimberly S. "Deep Play: Sports Mega-Events and Urban Social Conditions in the

    USA." *The Sociological Review* Vol 54, Issue 2. (December 2006): 160-174.

    DOI: 10.1111/j.1467-954X.2006.00659.

Sunnucks, Mike. "Super Bowl XLIX generated $295M in direct spending, $719M in overall

    impact." *Phoenix Business Journal*. (June 2015).

    http://www.bizjournals.com/phoenix/news/2015/06/23/super-bowl-xlix-generated-719m-

    in-direct-ripple.html.

"Super Bowl 50 Draws 111.9 Million TV Viewers, 16.9 Million Tweets." *Nielsen*. February 8,

    2016. http://www.nielsen.com/us/en/insights/news/2016/super-bowl-50-draws-111-9-

    million-tv-viewers-and-16-9-million-tweets.html.