RESEARCH NOTE:
CONTRARY EVIDENCE ON THE ECONOMIC IMPACT OF THE SUPER BOWL ON THE VICTORIOUS CITY

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Abstract: Previous research has indicated a surprising statistically significant positive impact on the local economy in the city that wins the Super Bowl. An analysis of per capita personal income growth in victorious Super Bowl cities from 1970-2001 cannot further confirm these results. While winning the Super Bowl is associated with an increase in income of $50 to $60 per capita, these results are less than half those found in previous studies and are not statistically significant at the 5% level.

JEL Classification Codes: L83 - Sports; Gambling; Recreation; Tourism; R53 - Public Facility Location Analysis; Public Investment and Capital Stock

Introduction

Professional sports are big business in the United States. If the popular media is to be believed, the championship games of the major professional leagues such as the National Football League's (NFL) Super Bowl generate huge profits for the metropolitan areas lucky enough to host or participate in these events.

Numerous scholars have attempted to estimate the impact of large sporting events and league championships on host cities. Baade and Matheson (2001) use employment and taxable sales data to find the effect of Major League Baseball's (MLB) All-Star Game on metropolitan areas. Porter (1999) uses taxable sales data determine the implications of holding the Super Bowl for host cities. Baade and Matheson (2004a, 2004b) use metropolitan area personal income data to estimate the impacts of soccer's World Cup and the Super Bowl on local economies. In all cases, the economic consequences of hosting these mega-events are statistically insignificant and certainly much smaller than the figures quoted by league and team boosters. The prevailing opinion among economists is that while these sporting events may be large in a gross sense, because of crowding out, leakages, and substitution effects, the net influence on the host city is small. For further discussion see Siegfried and Zimbalist (2000).

The one exception to this is rule is Coates and Humphreys (2002). Their examination of post-season play in the NFL, MLB, and the National Basketball Association (NBA) on real per capita personal incomes, similar to all of the previous studies, finds that the cities hosting post-season play experience no significant economic gains. In a very surprising discovery, however, they found that over the time period of their sample, 1969-1997, the city *winning* the Super Bowl experienced a statistically significant increase of roughly $140 in per capita income.

This result is particularly surprising considering that the Super Bowl, unlike the championships in the other major professional sports, hockey, basketball, and baseball, is held at a pre-determined neutral site rather than at one of the participants home fields. Therefore, while one might predict that the economies in the cities of the other sports' champions will be influenced by the economic activity surrounding the actual game(s), in the case of the Super Bowl, the winner's home town receives no direct revenue from the team's big victory since the event will likely take place thousands of miles away. In fact, no Super Bowl champion has ever won the big game in their own home stadium. Furthermore, because of the single-game elimination playoff system, it is quite possible that the winning team may never have played even a single post-season game at home.

Coates and Humphreys offer several reasons for their finding. They propose that the result could simply be an anomaly, the result of model mis-specification, or an omitted variable problem. Indeed, with 28 independent variables in their matrix of sports environment variables, one might expect at least one case of spurious correlation just based on the law of averages. They argue, however, that their finding is reasonably robust to the inclusion of a variety of additional explanatory variables and alternative functional forms. Instead they propose that the increase is possibly the result of labor productivity increases in the winning city. "If winning the Super Bowl has a stimulating effect on the productivity of the fans of the winning team, then the value of marginal product of these workers would increase as would the wage bill and income of these workers. This could possibly lead to an increase in real per capita income in a city for a short period of time." (Coates and Humphreys, 2002, pg. 298)

It is curious that only football, and not professional basketball or baseball leads to this increase in productivity, but this is explained by the authors by the fact that it is football and not any of the other sports that truly captures the heart and soul of a city. Others argue that winning championships might actually reduce productivity since the resulting parades and celebrations often result in business closures and because of the unfortunate circumstance that fan rioting after sporting championships has become increasing commonplace in the United States. (Baade and Matheson, 2003) The questions remains, however, how to explain this curious result. In the next section, an alternative model to answer this riddle is proposed. The paper ends with results and conclusions.

Data and Methodology

The economic activity generated by or related to any sporting event is likely to be small relative to the overall economy, and isolating the event's impact, therefore, is not a trivial task. To this end, Coates and Humphreys (2002), as well as others including Baade and Matheson (2001), propose examining time-series panel data to estimate predicted versus observed values for certain economic variables in cities with particular sports histories. Specifically, Coates and Humphreys estimate per capita personal income using a fixed effect model on a panel of 39 large American metropolitan areas covering a 29-year time span. The model includes a dummy variable whose value is set equal to one in each victorious Super Bowl city during the year in which the team is the champion as well as individual dummy variables for each city in the model to account for regional differences in per capita incomes.

This analysis is repeated using the method outlined in Baade and Matheson (2004b). The panel of data consists of the 73 largest metropolitan statistical areas (MSA) by population from 1969-2001. The cities are chosen to include all cities with major professional sports franchises and cities with expressed professional sports aspirations as well as cities of a similar size.

Equation (1) presents a fixed effect model that can be used with this data set to predict changes in per capita income for cities winning the Super Bowl.

$$\Delta Y_t^i = b_0 + b_1 \Delta Y_{t-1}^i + b_2 \frac{Y_{t-1}^i}{\sum_{k=1}^{n} Y_{t-1}^k / n} + b_3 W_t^i + b_4 OT_t^i + b_5 POP_t^i + b_6 SB_t^i + a_i C^i + g T_t + e_t^i \quad (1)$$

For each time period t, Y_t^i is the real per capita personal income and ΔY_t^i is the change in real per capita personal income in the ith metropolitan statistical area (MSA), n is the number of cities in the sample, W_t^i is the nominal wage in the ith MSA as a percentage of the average for all cities in the sample, POP_t^i is the log population of the ith city, SB_t^i is a dummy variable for winning the Super Bowl, and ϵ_t^i is the stochastic error. OT_t^i is a dummy variable that represents any significant city-specific economic influences that cannot be explained by other variables in the model including the effects of the oil booms of the 1970s and the subsequent oil bust of the 1980s on oil patch cities of New Orleans and Houston, the effects of Hurricane Andrew on the economy of South Florida, and the economic consequences of the tech boom in Silicon Valley. C^i is a vector of dummy variables representing the fixed effect for each city i, and T_t is a vector of dummy variables representing each year t accounting for the business cycle. In other words, the model will estimate real per capita income growth in this panel of data by estimating coefficients that explain how each individual city's growth differs from the average (C^i), how growth in each year differs from the average (T_t), and how per capita income growth is affect by independent variables such as population, relative wages, and relative incomes (POP_t^i, W_t^i, $Y_{t-1}^i / \sum Y_{t-1}^k / n$), city specific variables (Y_{t-1}^i, OT_t^i), and winning the Super Bowl (SB_t^i).

The results of ordinary least-squares regression using equation (1) are shown in Table 1.

The coefficient (0.53%) and t-statistic (1.919) on the Super Bowl winners variable indicate that winning the Super Bowl is associated with an increase in city per capita personal income growth of 0.53%, a borderline significant result at the 5% level. Given the average per capita income of the Super Bowl champions, this corresponds to an increase of $89 per person, roughly two-thirds that of the figure reported by Coates and Humphreys, although the statistical significance of the result partially confirms their initial test.

While the use of fixed effect models is widespread due to their simplicity, they present numerous theoretical and applied difficulties that make their use undesirable when they can be avoided. First, the assumptions implicit in the model are quite extreme in that it is assumed the only difference in city growth rates is a fixed percentage in each period. This belies the fact that some cities (such as Detroit or San Jose) are strongly influenced by cyclical industries, and others have experienced growth spurts or slowdowns at varying times in their recent history. To assume that every economic variable affects every city's economic growth in exactly the same way is an absurd albeit often necessary assumption. While many researchers, including Coates and Humphreys, include city-specific time trends in order to correct for some of these problems, unless city-specific variables are included for all variables, the problem remains. In addition, heteroscedasticity is identified as a problem since the variability of the residuals differs widely between cities. Finally, the ease with which sports related variables can be added to the model leads to a temptation to include large numbers of variables of questionable significance. Add enough variables and something is going to turn out to statistically significant.

In order to compensate for the short-comings of the fixed-effect model, a simplified version of equation (1) can be re-estimated separately for each of the fourteen different metropolitan areas that have won at least one Super Bowl since 1970. Equation (2) represents the new model used to predict changes in per capita income for winning cities.

$$\Delta Y_t^i = b_0 + b_1 \sum_{k=1}^{n} \frac{\Delta Y_t^k}{n_t} + b_2 \Delta Y_{t-1}^i + b_3 TR_t^i + b_4 OT_t^i + a\, SB_t^i + e_t^i \qquad (2)$$

The variables generally remain the same as in equation (1) although numerous variables such as population, relative wages and relative income are not included in the model because of a lack of degrees of freedom and multicolinearity problems that do not appear in panel data setting. The effect of the business cycle is now accounted for by introducing a variable representing the average per capita income growth in the 73 MSAs in the original panel data ($\sum \Delta Y_t^i / n$). A time trend variable, TR_t^i, is included to account for cities that have experienced faster or slower per capita economic growth over the time frame of the data. Finally, the variable SB_t^i is now a vector of dummy variables representing the Super Bowl with a separate dummy variable being included for each year a particular city has hosted the game. The model is estimated independently for each city both including and omitting a lagged dependent variable in the estimation as in Coates and Humphreys. The regression results exhibit a wide range of coefficients for the "average per capita income growth" variable and the lagged dependent variable, which indicates the limitations of a fixed effect model where the model forces these effects to be the same in each city. For the purposes of this study, only the coefficients on the Super Bowl dummy variables are of further interest, but full regression results are available from the author upon request.

The coefficients on the dummy variables for each individual Super Bowl in the regression equations represent the difference between the observed per capita income growth and that predicted by the model. Table 2 shows the year, winning city, real per capita income, observed real per capita income growth, the difference between observed and predicted growth as estimated by the coefficients on the Super Bowl dummy variables, the t-statistics on the Super Bowl dummy variables, and the per capita dollar value of the Super Bowl impact as estimated by the model.

The statistics recorded in Table 2 suggest two things worth noting. First, the dollar differences recorded in the final column vary substantially with some cities exhibiting income gains of over $500 per capita in excess of model predictions, and other cities showing a large negative impact. Second, the average city has experienced per capita income growth during the year of a Super Bowl championship roughly 0.35% above that predicted by the model. This translates into income gains presumably attributable to the Super Bowl victory of $50 to $60 per person or roughly one-third less than that estimated by model 1 and one-half to two-thirds less than that estimated by Coates and Humphreys.

The magnitude of the variation of the estimates at first blush appears high. The explanation for this range of estimates is simply that the models do not explain all the variation in estimated real per capita income growth, and, therefore, not all the variation can be attributable to winning the Super Bowl. In short, there are omitted variables. While the model fit statistics for the individual city regressions display moderately high R-squared numbers, the standard error of the estimate for the typical city is roughly one percent meaning that one would expect the models to predict actual per capita income growth for the cities within one percentage point about two-thirds of the time. Given the size of these large, diverse economies, the effect of even a large event like a Super Bowl win, with hundreds of millions of dollars of potential impact, is likely to be obscured by natural, unexplained variations in the economy. Indeed, none of the individual Super Bowl dummy variables is statistically significant at the 5% level.

While it is unlikely that the models for any individual city will capture the effects of even a potentially large occasion like winning the Super Bowl, one would expect that across a large number of cities and years, any event that produces a big impact would emerge on average as statistically significant. The individual years can be compared using the t-statistics on the Super Bowl dummy variables which are distributed N~(0,1). A test of the hypothesis that the average of the t-statistics of the dummy variables in the two models is different than zero provides t-statistics of 1.85 and 1.46 for the models with and without the lagged dependent variable, respectively, and corresponding p-values of 6.40% and 14.55%.

Conclusions

An analysis of real per capita personal income growth in the year of the Super Bowl in the winning team's home city shows a slight increase in personal income growth of between $50 and $60, but this increase is not statistically different than zero at a 5% level. This contradicts recent findings by Coates and Humphreys (2002) that showed a statistically significant gain in per capita incomes in winning cities of roughly $140. Their plausible explanations for the gain included both the possibility that the finding was spurious and a theory that jubilant fans in the city were more productive following the championship as a direct result of their team's success.

The finding in this paper makes it much easier to accept their first conclusion that the finding was purely an anomaly, and at the very least suggests that the dollar value of winning the Super Bowl is likely to be lower than their estimate of $140 per person. Obviously, additional research will be required to determine which set of results truly reflects the real impact of winning sports championships on local economies. Based on this study, however, the impact appears to be small or non-existent. While Caesar may thought that the way to keep citizens happy and productive was to provide “bread and circus,” winning the Super Bowl does not seem to be this magic ticket to riches.

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TABLE 1
Regression results for Fixed Effect Model

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.853	0.728	0.712	0.01364

ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.008	116	0.009	46.676	0.000
Residual	0.378	2028	0.000		
Total	1.386	2144			

Dependent Variable: %Δ Per Capita Income	Unstandardized Coefficients		Standardized Coefficients	t	Significance
			Beta		
Independent Variables	B	Std. Error			
(Constant)	0.2753	0.0432		6.368	0.0000
%Δ Per Capita Income (t-1)	0.2757	0.0211	0.2769	13.090	0.0000
Log Population	-0.0344	0.0068	-0.3709	-5.073	0.0000
Income as % of sample average (t-1)	-0.0486	0.0069	-0.2835	-7.075	0.0000
Wages as % of sample average (t-1)	-0.0235	0.0071	-0.1283	-3.318	0.0009
Hurricane Andrew	-0.0925	0.0140	-0.0786	-6.609	0.0000
Hurricane Andrew recovery	0.1442	0.0141	0.1224	10.198	0.0000
Tech Boom 1	0.0552	0.0082	0.0812	6.701	0.0000
Tech Boom 2	0.0932	0.0084	0.1371	11.154	0.0000
Tech Bust	-0.0716	0.0087	-0.1052	-9.209	0.0000
Super Bowl	**0.0053**	**0.0027**	**0.0235**	**1.919**	**0.0551**
Oil Boom 1	0.0100	0.0037	0.0359	2.731	0.0064
Oil Boom 2	0.0123	0.0032	0.0508	3.811	0.0001
Oil Bust	-0.0246	0.0027	-0.1307	-9.209	0.0000
Albany-Schenectady-Troy (MSA)	0.0022	0.0036	0.0101	-0.603	0.5468
…					
Year 2001	-0.0139	0.0023	-0.0990	-5.950	0.0000
…					

Fixed effects for individual cities/years shown for Albany MSA and the year 2001 but are excluded for remaining years and cities. Full results available from the author upon request.

TABLE 2

				Including lagged dependent variable			Not including lagged dependent		
Year	**SB Winner**	**Real GDP**	**Actual Growth**	**Difference**	**t-stat**	**Income +/-**	**Difference**	**t-stat**	**Income +/-**
1970	Kansas City	$ 10,960	0.249%	-	-	-	-0.332%	-0.284	$ (36.41)
1971	Baltimore	$ 14,304	1.419%	-0.041%	-0.052	$ (5.88)	-0.159%	-0.203	$ (22.68)
1972	Dallas	$ 12,249	6.539%	-0.031%	-0.021	$ (3.74)	0.261%	0.186	$ 31.99
1973	Miami	$ 13,418	5.662%	2.747%	1.506	$ 368.62	2.446%	1.174	$ 328.22
1974	Miami	$ 13,025	-3.089%	0.143%	0.076	$ 18.61	-0.442%	-0.207	$ (57.59)
1975	Pittsburgh	$ 11,802	0.528%	1.104%	1.061	$ 130.27	0.852%	0.655	$ 100.60
1976	Pittsburgh	$ 12,294	4.082%	1.724%	1.763	$ 211.96	1.190%	0.966	$ 146.29
1977	Oakland	$ 14,866	2.637%	-0.420%	-0.373	$ (62.42)	-0.390%	-0.374	$ (57.91)
1978	Dallas	$ 14,143	6.547%	1.722%	1.291	$ 243.49	1.813%	1.371	$ 256.35
1979	Pittsburgh	$ 13,254	0.500%	-0.944%	-0.970	$ (125.06)	-0.401%	-0.329	$ (53.17)
1980	Pittsburgh	$ 12,939	2.303%	-1.394%	-1.350	$ (180.34)	-1.899%	-1.470	$ (245.68)
1981	Oakland	$ 15,561	0.269%	-0.072%	-0.065	$ (11.21)	-0.033%	-0.032	$ (5.14)
1982	San Francisco	$ 19,585	-0.270%	0.088%	0.054	$ 17.17	-0.082%	-0.053	$ (16.14)
1983	Washington	$ 16,496	3.960%	1.543%	1.805	$ 254.50	1.172%	1.211	$ 193.39
1984	Los Angeles	$ 15,276	4.513%	0.050%	0.038	$ 7.60	0.044%	0.034	$ 6.79
1985	San Francisco	$ 21,493	1.038%	-2.026%	-1.179	$ (435.47)	-2.206%	-1.436	$ (474.07)
1986	Chicago	$ 16,260	3.775%	0.906%	1.131	$ 147.27	0.919%	1.172	$ 149.47
1987	New York	$ 17,991	3.237%	1.485%	0.882	$ 267.11	1.425%	0.908	$ 256.28
1988	Washington	$ 20,216	3.912%	0.977%	1.160	$ 197.43	1.073%	1.107	$ 216.85
1989	San Francisco	$ 23,645	0.997%	-1.179%	-0.708	$ (278.66)	-1.296%	-0.841	$ (306.45)
1990	San Francisco	$ 24,096	3.119%	2.464%	1.537	$ 593.67	2.451%	1.560	$ 590.52
1991	New York	$ 19,311	-1.542%	-0.708%	-0.411	$ (136.66)	-0.742%	-0.447	$ (143.21)
1992	Washington	$ 20,323	0.535%	-0.648%	-0.713	$ (131.64)	-1.226%	-1.262	$ (249.07)
1993	Dallas	$ 16,680	1.213%	0.149%	0.115	$ 24.80	0.128%	0.099	$ 21.35
1994	Dallas	$ 16,994	2.153%	0.443%	0.341	$ 75.36	0.528%	0.412	$ 89.81
1995	San Francisco	$ 24,328	3.184%	0.359%	0.216	$ 87.32	0.515%	0.325	$ 125.35
1996	Dallas	$ 17,694	2.713%	1.136%	0.871	$ 200.97	1.142%	0.883	$ 202.12
1997	Green Bay	$ 16,191	3.720%	1.696%	1.663	$ 274.62	1.516%	1.332	$ 245.47
1998	Denver	$ 19,958	4.195%	-0.931%	-0.766	$ (185.84)	-0.708%	-0.548	$ (141.28)
1999	Denver	$ 20,717	3.803%	1.164%	0.989	$ 241.07	1.366%	1.106	$ 283.07
2000	St. Louis	$ 18,426	2.880%	-0.879%	-1.192	$ (161.94)	-0.526%	-0.693	$ (96.88)
2001	Baltimore	$ 19,220	0.793%	1.204%	1.450	$ 231.41	1.436%	1.786	$ 275.95
		$ 16,991	2.412%	0.382%	0.327	$ 60.46	0.307%	0.253	$ 50.44