The Economic Impact of Postseason Play in Professional Sports*

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Abstract

An empirical examination of the determinants of real per capita income in cities with professional sports teams from 1969-1997 shows that postseason appearances are not associated with any change in the level of real per capita income in these cities. However, in the city that is home to the winning team from the Super Bowl, real per capita personal income is found to be higher by about $140, perhaps reflecting a link between winning the Super Bowl and the productivity of workers in cities. Overall, economic benefits flowing from future postseason appearances cannot justify public expenditures on professional sports franchises or facilities.

"What impact will playing in the Super Bowl have on the local economy?"

We fielded this question dozens of times in January 2001, when our local professional football team made an appearance in Super Bowl XXXIII. Our stock answer, based on a large body of research, recently surveyed by Siegfried and Zimbalist (2000), showing that professional sports, at best, has no economic impact on a city's economy and, at worst, some residents of these cities are made poorer by professional sports, was "not very much at all." To our knowledge, no comprehensive econometric study of the economic impact of postseason play has been carried out. Porter (1999), in an innovative study, examined monthly commercial sales, hotel rates, and room occupancy data in three counties that hosted six Super Bowls between 1979 and 1996. One Super Bowl produced a small positive impact on commercial sales, two produced a small negative impact, and the others had no detectable economic impact on commercial sales.

The primary evidence of the economic impact of postseason appearances in professional sports leagues comes from "economic impact studies" produced by local economic development and planning agencies, and consultants working for local governments. The estimated economic impact from hosting the Super Bowl and other postseason contests generated by these studies is always positive, although the dollar value of the estimated impact, and the underlying assumptions that produce these estimates, varies widely. Table 1 shows the reported estimated economic impact from several recent postseason sporting events, in real 1993 dollars. The largest of these impacts, for the Super Bowl in Miami in 1995, is about 1% of real personal income in the Miami SMSA in that year; the smallest, for the postseason appearance by the St. Louis Cardinals in 2000, is about 0.1% of real personal income in the St. Louis SMSA in that year. These estimated impacts are not large, but 1% increases in income should be detectable in a model of income determination in a specific metropolitan area.

A better understanding of the economic impact of postseason appearances in professional sports is important because the impact studies mentioned above indicate that the popular press, policy makers, and the public believe that postseason appearances are economically beneficial for cities. More importantly, these claimed benefits are often used to justify public subsidies for the construction of new sports stadiums and arenas.

Methodology and Data

We adapt the model used by Coates and Humphreys (1999), (2001a) and (2001b) to estimate the economic impact of postseason play. The empirical model is

Table 1: Reported Impact of Postseason Events, 1993 Dollars

Event	Location	Year	Total Economic Impact
Baseball Playoffs	San Francisco, CA	1989	$105.0 mil.
Super Bowl	San Diego, CA	1989	$166.0 mil.
Super Bowl	New Orleans, LA	1990	$263.0 mil.
Super Bowl	Tampa, FL	1991	$124.9 mil.
Super Bowl	Minneapolis, MN	1992	$123.6 mil.
Baseball Playoffs	Philadelphia, PA	1993	$40.0 mil.
Super Bowl	Atlanta, GA	1994	$135.0 mil.
Super Bowl	Miami, FL	1995	$346.0 mil.
World Series	New York, NY	1996	$39.2 mil.
Super Bowl	Phoenix, AZ	1996	$281.7 mil.
World Series	Miami, FL	1997	$45.0 mil.
Baseball Playoffs	New York, NY	1998	$79.8 mil.
Football Playoffs	St. Louis, MO	2000	$93.4 mil.
Baseball Playoffs	St. Louis, MO	2000	$33.6 mil.
World Series	New York, NY	2000	$42.0 mil.

Source: Porter (1999), Humphreys (1994) and various media sources.

$$y_{it} = \beta x_{it} + \gamma z_{it} + \delta ps_{it} + \mu_{it} \tag{1}$$

where y_{it} is real per capita income in city i in year t, x_{it} is a vector of variables that reflect exogenous economic and demographic factors that affect the level of real per capita income in city i in year t, z_{it} is a vector of variables that reflect the "sports environment" in city i in year t, ps_{it} is a vector of variables reflecting postseason appearances by professional sports teams located in city i in year t, β, γ and δ are vectors of unknown parameters to be estimated, and μ_{it} is a disturbance term. Because we do not derive the estimating equation from a fully specified theoretical model of income determination in an SMSA, our empirical model is best interpreted as a reduced form relationship. x_{it} contains the growth rate of the population in city i, city-specific time trends to capture the impact of all unmeasured factors that change over time and affect real per capita income in each city over the sample period, and year-specific dummy variables that capture short-run factors that have the same effect on all cities in the sample in a given year. The vector of "sports environment" variables, z_{it} represents an attempt to quantify the scale, scope and changes in professional sports in the cities in our sample. This vector of variables includes indicator variables for the presence of pro football, basketball and baseball franchises, the arrival and departure of franchises and the

construction of new stadiums and arenas, and stadium and arena seating capacities. Because of franchise movement and construction this vector contains variables that vary across cities and over time.

By assumption, the disturbance term takes the form

$$\mu_{it} = e_{it} + v_i \tag{2}$$

where v_i is a disturbance specific to city i which persists throughout the sample period, and e_{it} is a random shock in city i at time t which is uncorrelated across cities and over time. Estimated this way, the regression generates a city specific influence on real personal income per capita. This impact captures the influences of city characteristics that are invariant over time. Examples of these influences are geography and climate, the institutions of state and local government, and the region of the country.

Our approach is an ex post examination of what happened in cities with professional franchises and facilities over the past 30 years and is only a slight variation on the model used by Coates and Humphreys(1999) and (2001a). We do not make assumptions about the behavior of fans attending games or the relationship between direct and indirect spending on postseason games. The area of impact is the entire Standard Metropolitan Statistical Area (SMSA), which ignores state and local jurisdictional borders within large urban areas. The data used to estimate this linear reduced form model, and the results, are described below.

The Regional Economic Information System (http://www.bea.doc.gov/bea/regional/reis/) contains real personal income and population data for each of the 39 cities that had a professional football, basketball, or baseball franchise from 1969-1998.[1] The personal income series were deflated using the Consumer Price Index (CPI). The mean value for the hundreds of real dollars of real personal income per capita, the dependent variable in our analysis, is \$145.90 with a standard deviation of 27.04. In other words, this value corresponds to a mean real per capita personal income of \$14,590. A list of the specific SMSAs in the sample is available by request from the authors.

The vector of sports environment variables captures variation in the sports environment in cities. This vector includes: indicators for football, basketball and baseball franchises; indicators for the ten year periods following franchise entries and exits; indicators for the ten year period following construction or renovation of facilities; indicators for single and multiple use structures;

[1]We omit professional hockey from the analysis because a significant number of hockey franchises are in Canada and we do not know of a source of Canadian city-specific data comparable to the U.S. data in the Regional Economic Analysis System. In most instances hockey teams also play in the same arenas as NBA franchises with seasons that substantially overlap.

and seating capacity variables to capture the idiosyncratic nature of each individual professional sports venue, as well as to reflect the incremental effects of renovation. Data on sports franchises and stadiums come from Noll and Zimbalist (1997), Quirk and Fort (1992), the Ballparks.com website (`http://www.ballparks.com/`) and various issues of the *Information Please Sports Almanac* (2001).

The vector of postseason appearance variables contains indicator variables for postseason appearances in professional sports leagues and hosting the Super Bowl. There is an individual series for each level of postseason play in each sport. For example, in professional football we have an indicator variable for teams that made the playoffs, an indicator variable for teams that played in the Super Bowl, and an indicator variable for the team that won the Super Bowl in each year. These variables capture the incremental effect of reaching each successive level of postseason play in each professional sport. These variables take a value of one in years when the team from a particular city appeared in the postseason and a value of zero otherwise. We collected these data from websites for each of the professional sports leagues.

Empirical Results, Discussion and Conclusions

We estimate equation (1) using a fixed effects estimatior; v_i in equation (2) is a city-specific intercept and the empirical model also contains year dummy variables. A Hausman test indicated that this component of the error term should be treated as fixed and not random. We also include city-specific time trends to control for any unobservable factors in each city that affect real per capita income and change over time, like migration patterns, changes in industrial composition, or changes in other socio-demographic factors.

We also estimated the model with a lagged dependent variable as a control- shown on the left two columns of Table 2 - to capture other omitted time-varying city-specific factors. Coates and Humphreys (1999) and (2001a) included a lagged dependent variable in a similar model. Kiviet (1995) and Judson and Owen (1997) both show that, while inclusion of a lagged dependent variable in a fixed-effects model may lead to bias in the parameter on the lagged dependent variable, it has no effect on other parameters. As some questions have been raised about the lagged dependent variable specification, we present both sets of the results as a robustness check.[2] The parameter on the lagged dependent variable is highly significant and this model explains much more of the observed variation in real per capita income, but all other implications are essentially unchanged.

Like the results in Coates and Humphreys (1999) and (2001a), the parameters on the vector of sports environment variables (z_{it}) exhibit a wide variety of signs and significance. In general, there

[2]We thank Andy Zimbalist and Bruce Hamilton for raising this issue.

are more significant parameters in the model without a lagged dependent variable. Although many of the individual parameters on the sports environment variables are not significant, an overall F-test on this vector of variables, shown on Table 3, reveals that the vector of variables taken together is highly statistically significant in both model specifications.[3] The mean overall impact of the vector of sports variables, based on the parameter estimates shown on Table 2 and calculated at the sample average of the variables in this vector, is negative for both specifications, suggesting that the total impact of the professional sports environment on real per capita income in the cities in our sample over the past thirty years was negative for both specifications. Professional sports appears to have a detrimental effect on local economies, not a positive effect as proponents of subsidies for the construction of new sports facilities frequently claim.

There are a number of possible mechanisms by which professional sports could reduce real per capita income in cities. This topic is discussed in detail by Siegfried and Zimbalist (2000). Since we focus on the impact of postseason appearances in this paper, we simply point out that these estimates confirm the results in Coates and Humphreys (1999) and (2001a), using a sample of data that contains an additional year of observations and two additional cities - Nashville and Jacksonville.

The parameters on the vector of postseason appearance variables are our primary interest. In general, the parameters on the post- season appearance variables are not statistically different from zero, suggesting that postseason appearances by the local professional sports team have no beneficial effect on the local economy. These variables are not jointly significant, based on the F-test results shown on Table 3.

The parameter on the indicator variable for hosting the Super Bowl is not statistically significant. Hosting the Super Bowl has no measurable impact on real per capita income in the host city. This result contradicts the claims shown on Table 1 and confirms the results in Porter (1999). How can one to three hundred million dollars in spending not have a measurable impact on real per capita income in a large U.S. city? Porter (1999) offers several convincing explanations. The most plausible is a combination of capacity constraints and crowding out. Cities have a fixed capacity to accommodate out of town visitors, based on hotel rooms, restaurant seats, transportation and other fixed capital. If cities operate close to this capacity, then the "economic impact" of the Super Bowl simply replaces, or crowds out, spending by others who do not visit the city because of the Super Bowl. Additionally, if local merchants raise prices during the Super Bowl, then residents may be made worse off by paying more for locally produced goods and services during Super Bowl

[3]Basketball entry is an exception, raising the possibility that entry is endogenous. While possible, also note that most of the basketball entry years, about 40%, are in the period 1969-1973, an expansionary period in US economic history.

week.

There is one notable exception to the pattern of statistical insignificance on the postseason variables. The parameter on the indicator variable for winning the Super Bowl is positive and significant in the lagged dependent variable model (P-value .01) and nearly significant at the 10% level in the model with no lagged dependent variable (P-value .11), suggesting that winning the Super Bowl increases real per capita income in the home city of the NFL champion by about $140, about a one-percent increase relative to the mean.[4] This result is surprising, as the Super Bowl does not take place in the city where the participating teams play; the game rotates through a set of cities with enough stadium and hotel capacity to host the event. Little, if any, direct Super Bowl related spending takes place in the home cities of the participating teams. Participating in the Super Bowl does not provide any benefit to the city of the losing team. The Conference Champion variable is 1 for the two Super Bowl teams, and zero for all other teams, so any benefit from simply making the Super Bowl would be captured by this clearly statistically insignificant variable.

Explanations for this result are that winning the Super Bowl has tangible economic benefits for the home town of the champion team, that the Super Bowl variable captures the effects of some specification error or is simply an anomaly. The Super Bowl champion variable being significant only in the lagged dependent variable model supports the anomaly explanation. Recall, however, that this variable is nearly significant at the 10% level in the model without a lagged dependent variable. If the lagged dependent variable captures the omitted effects of other variables about the city that are persistent over time and not captured elsewhere, then its omission biases and makes inconsistent the coefficients on the included variables that are correlated with it. On the other hand, inclusion of an irrelevant explanatory variable only reduces the efficiency of the estimates. Adding the lagged dependent variable when it does not belong would not produce the difference found between the estimates on winning the Super Bowl with and without its inclusion. Consequently, the results with the lagged dependent variable as a regressor are, we feel, the better ones.

Other specification errors could affect the significance of the Super Bowl Champ variable in the lagged dependent variable model. A wide array of alternative specifications, including different functional forms and two-stage least squares to control for the possible endogeneity of winning the Super Bowl, were unable to alter the finding that winning the Super Bowl raises real personal income per capita. Our evidence suggests, therefore, that the significance of the Super Bowl championship indicator variable is not due to specification errors.

A likely mechanism by which winning the Super Bowl affects real per capita income in the home city of the champion is by increasing the productivity of labor following the championship game.

[4]The dependent variable, real personal income per capita in hundreds of dollars, has a mean value of 145.90.

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. We also found that the effect of winning this year's Super Bowl does not affect next year's income.

Winning the World Series or the NBA Championship does not appear to have a similar impact on productivity, weakening the economic significance of this result. The lack of an effect from winning other championships may be similar to a change in consumer confidence. Neither the World Series nor the NBA Championship has been elevated to the status of a national holiday the way the Super Bowl has. Indeed, the other championships last at least four games, while the Super Bowl is a one-time winner take all event. The morale boost from succeeding on the national, even global, stage in the do-or-die situation that the Super Bowl provides may be the production equivalent of a large boost in consumer confidence. The fact that playing in but losing the Super Bowl has no positive impact on incomes also supports this possibility. The negative coefficient on the Conference Champion variable, though insignificant, may hint that losing on a global stage may resemble a loss of consumer confidence.

Suppose winning the Super Bowl affects the productivity of some workers as our results seem to suggest. This does not justify the public subsidization of professional sports franchises on economic grounds. Building a new stadium with public funds does not guarantee a Super Bowl victory and any benefits from winning the Super Bowl are confined to the year in which the championship is won. The expected returns are, for these and other reasons, too small to justify a public outlay of several hundred million dollars. Public subsidies to professional sports franchises can be justified if the franchise generates consumption and other benefits to fans and the community in general greater than the costs of the subsidy. An accurate accounting of the costs and benefits must include the non-pecuniary consumption benefits enjoyed by fans who only watch the games on television or listen to them on the radio and the increased pride and satisfaction enjoyed by all who bask in the reflected glory of the team when it is successful. Coates and Humphreys (1999) state that one explanation for their finding that the professional sports environment has a negative impact on real personal income per capita is that this income loss is the value of these non-pecuniary benefits.

Our results suggest several future research topics. If winning the Super Bowl affects the productivity and earnings of some workers, this might also be detected in micro-level data on households or firms. These data contain evidence of changes in labor productivity over the business cycle and may also reveal changes in response to other exogenous factors. Evidence of changes in labor productivity might also be detectable in quarterly financial data for manufacturing firms. If changes in worker productivity were linked to professional sports, this would also be an interesting

contribution to the literature on the locational choices of businesses.

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Table 2: Fixed Effects Regression Results

	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
$y_{i,t-1}$	.818*	.017	–	–
Population Growth	.535*	.093	1.96*	.158
Baseball Stadium Cap.	-.090	.126	-.645*	.226
Capacity^2	.0008	.001	.006*	.002
Football Stadium Cap.	.054	.057	.231*	.105
Capacity^2	-.0002	.0003	-.001*	.0006
Basketball Arena Cap.	-.073	.115	.089	.207
Capacity^2	.002	.002	-.001	.004
Baseball Franchise	3.54	3.89	16.93*	6.99
Basketball Franchise	-.124	1.24	-1.92	2.23
Football Franchise	-3.55	2.43	-7.69*	4.37
Baseball Construction	-1.03*	.471	-1.80*	.847
Football Construction	-.196	.333	-1.76*	.596
Base./Foot. Construction	-.520	.385	-.390	.693
Basketball Construction	-.040	.282	.648	.506
Baseball Entry	.327	.427	-.630	.767
Football Entry	.854	.398	1.42*	.716
Basketball Entry	.787*	.297	2.21*	.531
Baseball Departure	-1.51*	.669	-4.17*	1.20
Football Departure	-.680	.494	.507	.888
Basketball Departure	-.003	.338	1.16*	.606
Made Baseball Postseason	.116	.291	.300	.523
League Champion	-.040	.487	-.058	.877
World Series Champion	-.072	.582	-.639	1.05
Made Basketball Postseason	-.073	.189	.119	.340
Basketball Champion	.375	.447	.345	.804
Made Football Postseason	.016	.199	-.333	.358
Conference Champion	-.190	.433	-.379	.779
Super Bowl Champion	1.40*	.570	1.61	1.02
Hosted Super Bowl	-.238	.423	-.091	.761
N / $R2$	1131	.98	1131	.70

*: Significant at 10% level.

Table 3: F-Tests on Vectors of Sports Variables

	Lagged Dependent Variable		No Lagged Dependent Variable	
Vector of Variables	F-statistic	P-value	F-statistic	P-value
Sports Environment	1.67	0.03	5.41	0.00
Postseason	1.14	0.33	0.53	0.85