AN EVENT STUDY OF THE ECONOMIC IMPACT OF PROFESSIONAL SPORT TEAMS ON LOCAL INCOMES

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ABSTRACT

Many cities have tried to use expensive incentives such as a state-of-the-art stadiums or tax exemptions to persuade major professional sport teams to relocate to or remain in their area. These cities do so because they expect a professional sport team to enhance the local economy. In this paper we utilize an event study approach to examine the economic impact of a sport team on the local economy. The results indicate a negative impact of a sport team on local per capita income in both the short and long-run.

INTRODUCTION

Many cities have used expensive incentives such as a state-of-the-art stadiums or tax exemptions in an attempt to persuade major professional sport teams to relocate to or remain in their area. These cities do so because they expect a professional sport team to enhance the local economy (Barta, 2001; Bocanegra, 2000). Since tax revenues are used to pay for the incentives offered to these teams, it is reasonable to investigate the resulting net effect of the professional sports teams on the economic welfare of local taxpayers.

In this study we examine both the short-term and long-term economic impact of professional sport teams at the metropolitan statistical area (MSA) level by testing to determine if the local income increases *unexpectedly* as a result of an expansion or relocation of a professional sport team. We evaluate both per capita income and its growth rate using the event study model, and consider the four major leagues: Major League Baseball (MLB), the National Basketball Association (NBA), the National Football League (NFL), and the National Hockey League (NHL).

The event study framework has been widely employed in finance problems to examine an unexpected return on investment as a result of the occurrence of an event. The event can be anything that might affect the return on investment including (1) firm-specific events, such as announcement of a stock split, takeover bid, or bankruptcy; or (2) market-wide events, such as announcement of a tax-cut, a change in the unemployment rate or interest rate, or an international trade agreement. In this approach, the market returns are regressed against the individual's returns using data before the event date. The parameters are then used to compute the expected individual's return after the event date. The relationship between error terms and firms' characteristics can also be examined further. Extensive details regarding event study methodology can be found in Henderson (1990). Through this approach, we incorporate important factors that previous studies fail to consider simultaneously: causality, overall economy, specific characteristics of local areas, and events' ages.

BACKGROUND

Researchers have studied the impact of sports from a variety of perspectives. Coates and Humphreys (2001) found no significant economic impact of strikes and lockouts of the professional sport leagues in the U.S. between 1969-1996. Many other studies such as Bird (1982), Sutherland and Haworth (1986), and Szymanski (2001) examined sport industries outside the United States with a primary focus on those in the United Kingdom. However, a limited number of studies investigate the economic impact of a professional sport team on the local economy. Baade (1994), Baade and Dye (1988, 1990), Coates and

Humphreys (1999), Noll and Zimbalist (1997), and Gius and Johnson (2001) applied regression analysis in their investigations. Baade (1994), Baade and Dye (1988, 1990), and Noll and Zimbalist (1997) found that a professional sport team has no significant economic impact on the local area. Baade and Matheson (2001) investigated the economic impact of major league baseball's all-star game since 1973 and reported a negative impact on host cities. However, Gius and Johnson (2001) concluded that cities with more than one major professional sport team have higher per capita income than cities that have no more than one major professional sport team.

Previous studies have not clarified the following issues. First, the overall economy of the U.S. should be taken into consideration since macroeconomic conditions influence local economies. Second, these macroeconomic conditions affect local economies differently depending on the local economic base (i.e., manufacturing, agriculture, or service). Therefore, the specific characteristics of each local economy must also be included in the model. Third, previous studies compare effects of events that occur at different points in time. It is not reasonable to compare an effect of an event that occurred 10 years ago to the effect of a recent event. Also, a dollar in 1990 is not equivalent to a dollar in 2000. Finally, the direction of causality is still undetermined. The standard regression approach detects linear relationship between dependent and independent variables but does not suggest a direction of causality.

The event study model attempts to address most of these issues. In this study, an event is defined as the establishment of a new professional sports team in an MSA through either expansion or relocation. We use per capita income at the MSA level and gross domestic product (GDP) as proxies for the local and overall economy, respectively, to estimate a linear relationship between the nation's economy and economy of each MSA. The resulting intercept and slope associated with an MSA embodies specific characteristics of the corresponding MSA's economy. We also employ relative dates instead of actual dates in order to compare effects of the event given the length of time since the event occurred. In addition, we address the causality issue by using pre-event data to estimate parameters and use the estimated parameters and post-event data to estimate the unexpected income.

THE DATA

Annual data from the period 1969-2000 are used in this analysis. The GDP and CPI are collected from the website of the Federal Reserve Bank of St. Louis (http://www.stls.frb.org/). Data on professional sport teams is obtained from CBS SportsLine.com (http://mlb.mlb.com/NASApp/mlb/index.jsp, http://www.nba.com/) and official league and team websites (http://www.nba.com/, and http://www.nhl.com/futures/index.html). Finally, the per capita income at the MSA level is gathered from the website of the Bureau of Economic Analysis (http://www.bea.gov/). In order to ensure the estimation data set includes at least ten observations per area, we limit our analysis to expansions and relocations of professional sport teams during the period 1980-2000 in the U.S. From 1980 to 2000, four MSAs in the U.S. gained MLB franchises, seven gained NBA franchises, nine gained NFL franchises, and thirteen gained NHL franchises through either expansion or relocation.

METHODOLOGY

We employ an event study approach in the analysis. In our analysis, there are at least two alternatives to take inflation into account: adjusting all unexpected income from different time periods to the dollar figure at a particular time or using the growth rate instead of nominal value of the income. For the first alternative, we identify the event date and separate data into two groups: estimate period data (the period from 1969 until one year prior to the expansion or relocation event) and event period data (the period immediately following the expansion or relocation event). Note that we exclude the year prior to the first season in order to eliminate the announcement effect identified by French and Disher (1997), who found that Olympic host cities experience an economic reaction that begins when the host city is announced. We use the estimate period data to explore linear relationships between market returns and the economic indicators for cities following the (1) equations. Once we have estimated all parameters, we use the event-period data to compute the unexpected income using the (2) equation. Finally, we use the CPI to adjust the unexpected income so that all such incomes are measured in year 2000 dollars.

$$INC_{ij} = b_{0i} + b_{1i}GDP_j \qquad (1)$$
$$\epsilon_{ij} = INC_{ij} - b_{0i} - b_{1i}GDP_j \qquad (2)$$

where INC_{ij} = per capita income for the ith MSA in year j

GDP_j = US gross domestic product in year j

b_{01i} = intercept for the ith state

b_{11i} = slope for the ith state

ϵ_{ij} = unexpected income for the ith state in year j

The second alternative is similar except that we use the growth rate of per capita income and of the GDP in the calculation. The growth rate is computed as follows:

$$GIN_i = \frac{INC_i - INC_{i-1}}{INC_{i-1}} \quad (3)$$

where GIN_i = growth rate of per capita income at year i

INC_i = per capita income at year i

As a result, we lose the first-year date and the (1) and (2) equations become:

$$GIN_{ij} = b_{02i} + b_{12i}GDP_j \quad (4)$$
$$\epsilon_{ij} = GIN_i - b_{0i} - b_{1i}GDP_j \quad (5)$$
$$CAR_i = \epsilon_{i0} + \epsilon_{i1} + \epsilon_{i2} + \ldots + \epsilon_{i10} \quad (6)$$

where $GINC_{ij}$ = per capita income for the ith state in year j

GDP_j = US gross domestic product in year j

b_{01i} = intercept for the ith state

b_{11i} = slope for the ith state

ϵ_{ij} = the unexpected income for the ith state in year j

CAR_i = the cumulative unexpected income for the ith state from year 0-10

We then regress the unexpected income against the number of existing teams for MLB, NBA, NFL, and NHL. The unexpected income for year 0, 1, 2, 3, and 4 represent short-term effects while the cumulative unexpected income from year 0 to year 10 represents the long-term impact.

EMPIRICAL RESULTS

Table 1 and 2 summarize results of the first alternative (the adjusted dollar approach) while Table 3 and 4 summarize results of the second alternative (the growth-rate approach). Table 1 provides a summary of the short-term and long-term unexpected income by type of sport. The results indicated that an establishment of a sport team precedes an estimated decrease in per capita income of $1,116.96 during the team's first year in the MSA and $13,901.08 during a 10-year period immediately following the establishment or relocation of the team. The highest long-run cost is associated with NBA teams; however, the decrease in per capita income associated with a professional basketaball team during the first four years is not statistically significant. On the other hand, the negative effect of an MLB team is significant only in the short-run, while the negative impact of both NFL and NHL franchises are statistically significant in both short and long run. The overall results support the findings of prior research that the professional sport teams do not have a positive economic impact on the local economy. In Table 1, we provide the results of independent t-test of the null hypothesis that expanding and relocating teams economically affect local income the same way. We regress the ϵ_{ij} term from equation (2) against a dummy variable representing the type of the new major league market (expansion or relocation). The consistently large p-values (all of which exceed 0.50) lead us to conclude that the economic impact of an expansion team and a relocated team do not differ. Table 2 presents regression results between the unexpected income (dependent variable) and the number of existing teams categorized by type of sports (independent variables). The linear regression analyses indicate that, in the long run, an additional football team would increase the unexpected income by $109.99 on average while an additional basketball team would decrease the unexpected income on average by $88.14. However, a change in per capita income within the range of -$88.14 and +$109.99 over ten years is not substantial. Thus, we would suggest that the number of existing teams has no impact on the local income.

TABLE 1: Short- and Long-term impact on per capita annual income (in $)

Type	Year 0	Year 1	Year 2	Year 3	Year 4	CAR
Overall	-1116.96	-1365.46	-1668.62	-1769.17	-2107.75	-13901.08
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
MLB	-1463.91	-2141.31	-2266.92	-2179.58	-2562.48	-12581.74
	(0.0006)	(0.0014)	(0.0033)	(0.2335)	(0.2813)	(0.0915)
NBA	-372.61	-676.82	-821.70	-1004.74	-1674.34	-22854.05
	(0.2661)	(0.1136)	(0.1662)	(0.1152)	(0.0743)	(0.0100)
NFL	-1252.95	-1433.63	-1753.95	-1869.73	-2456.38	-14403.54
	(0.0007)	(0.0059)	(0.0003)	(0.0034)	(0.0038)	(0.0411)
NHL	-1393.70	-1498.50	-2035.82	-2205.47	-2112.44	-9400.93
	(0.0001)	(0.0008)	(0.0012)	(0.0005)	(0.0054)	(0.0112)
Expansion	-0.07	0.51	0.11	0.05	0.42	-0.51
	(0.9410)	(0.6160)	(0.9110)	(0.9638)	(0.6760)	(0.6107)

TABLE 2: Effects of number of existing teams on the per capita income

Type	Year 0	Year 1	Year 2	Year 3	Year 4	CAR
Intercept	-372.42	-848.46	-2309.57	-2098.03	-409.61	-362.36
	(0.8189)	(0.6923)	(0.4745)	(0.5341)	(0.9007)	(0.8141)
MLB	-11.949	28.51901	-7.98197	61.71079	32.61765	-7.63112
	(0.7424)	(0.5506)	(0.9162)	(0.2846)	(0.7166)	(0.8244)
NBA	-48.6055	-32.5001	-72.1448	-63.2458	-114.459	-88.1446
	(0.0205)	(0.1897)	(0.0289)	(0.1080)	(0.0576)	(0.0001)
NFL	64.17077	40.59962	134.4137	65.30706	100.1614	109.9934
	(0.0844)	(0.4161)	(0.0723)	(0.4649)	(0.3219)	(0.0034)
NHL	-9.64385	-38.8095	-42.924	-53.4099	-33.9533	-29.0134
	(0.6362)	(0.1286)	(0.2825)	(0.2032)	(0.4901)	(0.1264)
R-Sq	0.4151	0.3720	0.4490	0.4050	0.4358	0.1960
p-value for the F-statistics (?)	0.0076	0.0251	0.0109	0.0350	0.0363	0.0001

In Table 3 we provide evidence that a professional sport team significantly slows the growth rate of per capita income in both the short-run and long-run. The growth rates range from 0.33% of a hockey team to 7.08% of a football teams. Relocation or expansion of the NFL into an MSA coincides with a declining growth rate in per capita income in both the short and long-run, while relocation or expansion of the NBA into an MSA corresponds with only a short-run decline in the growth rate of per capita income (and no long-run change in the growth rate of per capita income). The negative impact of MLB and NHL teams is neither substantial nor statistically significant. Results of the independent t-test of effects between expansion and relocation teams are also reported with no significant differences detected, which implies that both expansion and relocation teams similarly affect the growth rate of income. In Table 4, results indicate no relationship between the growth rate of income and the number of existing teams. Thus, the number of existing teams does not affect the growth rate of income.

CONCLUSION

Municipalities compete fiercely for professional sports franchises, offering concessions and incentives in the hundreds of millions of dollars to entice an existing franchise to relocate or convince a league to award them an expansion franchise. This

TABLE 3: Short- and Long-term impact on the growth rate of per capita income

Type	Year 0	Year 1	Year 2	Year 3	Year 4	CAR
Overall	-0.00449	-0.00963	-0.01373	-0.00961	-0.01446	-0.07003
	(0.2912)	(0.0020)	(0.0004)	(0.0102)	(0.0310)	(0.0022)
MLB	0.02032	-0.02474	0.00268	-0.00824	-0.01400	-0.02760
	(0.4866)	(0.0120)	(0.6298)	(0.3856)	(0.4284)	(0.0773)
NBA	-0.00612	-0.01314	-0.01476	-0.01706	-0.03080	-0.20540
	(0.3886)	(0.1177)	(0.0970)	(0.0749)	(0.0912)	(0.0003)
NFL	-0.01391	-0.00701	-0.02107	-0.00511	-0.02009	-0.07078
	(0.0100)	(0.2344)	(0.0048)	(0.5435)	(0.0519)	(0.0526)
NHL	-0.00508	-0.00219	-0.01194	-0.00713	0.00658	-0.00328
	(0.2155)	(0.5440)	(0.1278)	(0.1441)	(0.2076)	(0.9240)
Expansion	-0.66	1.22	0.46	1.36	1.27	0.04
	(0.5146)	(0.2327)	(0.6491)	(0.1875)	(0.2220)	(0.9656)

TABLE 4: Effects of number of existing teams on the growth rate of per capita income

Type	Year 0	Year 1	Year 2	Year 3	Year 4	CAR
Intercept	0.1337	0.0014	-0.0939	-0.03443	-0.3139	-0.0943
	(0.3846)	(0.9897)	(0.5275)	(0.7946)	(0.1211)	(0.0920)
MLB	0.0041	-0.0033	-0.0061	0.0067	0.0051	0.0026
	(0.6294)	(0.5725)	(0.4919)	(0.2427)	(0.7063)	(0.4117)
NBA	-0.0010	-0.0045	-0.0084	-0.0044	-0.0037	-0.00421
	(0.8353)	(0.1349)	(0.0277)	(0.2471)	(0.6662)	(0.0215)
NFL	-0.0109	0.0049	0.0158	-0.0018	0.0152	0.0042
	(0.2074)	(0.4190)	(0.0673)	(0.8398)	(0.3132)	(0.2095)
NHL	0.0036	0.0025	0.0007	0.0005	-0.0073	0.0002
	(0.4578)	(0.4142)	(0.8781)	(0.9095)	(0.3221)	(0.9041)
R-Sq	0.1386	0.1076	0.2176	0.2125	0.1552	0.0494
p-value for the F-statistics	0.4233	0.6040	0.2498	0.3120	0.5530	0.0303

competition continues despite strong economic evidence that a professional sport team does not have a positive impact on the local economy. However, the research that has produced this evidence fails to consider some important factors: inflation, causality, overall economy, specific characteristics of local areas, and events' ages. This paper takes inflation into account and employs the model of the event study to mitigate these concerns.

The results of this research confirm prior research findings – we find that a professional sport team does not have a positive economic impact on the local community. The results indicate that a professional sport team negatively affects the local income. Thus, our results imply that professional sport teams do not justify the abatements, concessions, and incentives that are used to attract them to an MSA. If their goal is to increase their citizens' per capita income, cities should stop using these tactics to attract professional sports teams to their markets.

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