Growth Effects of Sports Franchises, Stadiums, and Arenas: 15 Years Later

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September 2015

MERCATUS WORKING PAPER

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Dennis Coates. "Growth Effects of Sports Franchises, Stadiums, and Arenas: 15 Years Later." Mercatus Working Paper, Mercatus Center at George Mason University, Arlington, VA, September 2015.

Abstract

A 1999 study by Dennis Coates and Brad R. Humphreys found the presence of major sports franchises to have no significant impact on the growth rate of per capita personal income and to be negatively correlated with the level of per capita personal income for a sample of all cities that had been home to at least one franchise in any of three professional sports—baseball, basketball, and football—at some time between 1969 and 1994. This paper returns to the questions Coates and Humphreys asked using an additional 17 years of data and a number of new stadiums, arenas, and franchises. The data cover 1969–2011 and add hockey and soccer franchises to the mix while also including all standard metropolitan statistical areas rather than just those that housed franchises in the major professional leagues. The analysis also adds two new dependent variables: wage and salary disbursements and wages per job. The results here are generally similar to those of Coates and Humphreys; the array of sports variables, including presence of franchises, arrival and departure of clubs in a metropolitan area, and stadium and arena construction, is statistically significant. However, individual coefficients frequently indicate harmful effects of sports on per capita income, wage and salary disbursements, and wages per job.

JEL codes: Z2, Z28

Keywords: economic impact, sports, sports economics, stadium, arena, sports franchise, sports league, baseball, basketball, football, hockey, soccer

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Acknowledgments

This paper was supported by research assistance from the Mercatus Center at George Mason University. I thank Brian M. Deignan for his efforts putting together the data for the project.

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15 Years Later

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I. Introduction

A 1999 study by Coates and Humphreys found the presence of major sports franchises to have no significant impact on the growth rate of per capita personal income and to be negatively correlated with the level of per capita personal income for a sample comprising all cities that had been home to at least one franchise in any of three professional sports—baseball, basketball, and football—at some time between 1969 and 1994. This paper returns to the questions asked by Coates and Humphreys (1999) using an additional 17 years of data and a number of new stadiums, arenas, and franchise movements. The data here cover 1969 through 2011 and add hockey and soccer franchises to the mix. They also include all standard metropolitan statistical areas (SMSAs) rather than just those areas that housed franchises in the major professional leagues. The analysis also adds two new dependent variables: wage and salary disbursements and wages per job. The results here are generally similar to those of Coates and Humphreys (1999); the array of sports variables, including presence of franchises, arrival and departure of clubs in a metropolitan area, and stadium and arena construction, is statistically significant. However, individual coefficients frequently indicate a negative relationship between sports and per capita income, wage and salary disbursements, and wages per job.

Sports is big business, especially team sports such as football, basketball, and baseball. Whether the issue is contracts for professional players, contracts for broadcast rights, or universities switching conferences, the amounts of money involved seem unreal to most people. Given the money that changes hands in the business of sports, thinking that this business has a large influence on the local economy of the cities or metropolitan areas where the teams play is natural. Indeed, communities around the country are told frequently of the large economic effects of building a new stadium or arena and of acquiring or losing a team. Cities, counties, and states often find a way to subsidize construction of sports facilities and, in recent times, to subsidize operating expenses, too; they do so partly in response to the promised economic results.

The size and even the existence of these effects have been the subject of a large body of literature over the past 20 years. Several reviews of the literature exist, and this paper will discuss the broader literature in more detail in the next section. Coates and Humphreys (1999) was the first study in this literature to include in a single (time-series cross-section) regression all the cities that hosted at least one franchise from the National Football League (NFL), National Basketball Association (NBA), or Major League Baseball (MLB) at any point during the period 1969 to 1996. Moreover, that study's analysis includes variables for stadium and arena construction, for entry and exit of franchises, and for stadium and arena capacities, as well as for the presence of franchises for each of the three sports separately. Coates and Humphreys refer to this array of variables as the *sports environment*. They found that the entire sports environment matters for the level of real personal income per capita, in the sense that the array of sports variables are jointly statistically significant. But contrary to the promised increase, the presence of a major sports franchise lowers the income.

Whereas the array of sports variables is jointly statistically significant, few of the variables are individually so. Joint significance combined with individual insignificance can occur if individual variables are highly correlated and separating their individual influences is not possible. One solution to this problem is to obtain more data. As previously stated, this study returns to the analysis of Coates and Humphreys (1999) but with an additional 17 years of data.

In the intervening period, a large number of new stadiums and arenas have been built, more teams have relocated, and some new teams have come into existence. In addition, the large number of stadiums built in the early and middle 1990s have now been around well beyond their "honeymoon" period, thus enabling an examination of their long-term effects that was not possible in the original Coates and Humphreys paper. Also, this expanded dataset provides the potential to get more precise estimates of the effects of individual sports and the effects of entry and exit and to reassess the two questions posed by Coates and Humphreys in 1999: (1) whether franchises, stadiums, and arenas affect the level of income per capita in a community and (2) whether they alter the rate of growth of income per capita.

The results of this exercise are largely consistent with the findings of Coates and Humphreys (1999) and of numerous other studies that have found that the effect of sports franchises and stadium and arena construction on local economies is weak or nonexistent. Indeed, franchises, stadiums, and arenas may be harmful rather than beneficial to the local community. Moreover, the results are not limited to per capita personal income but hold also for wage and salary disbursements and wages per job, two outcomes not considered by Coates and Humphreys in 1999.

The next section of this paper provides a summary of the existing literature on the effect of sports franchises on local economies. Subsequent sections describe the data, the estimating strategy, and the results, respectively. The final section restates the main findings and the contribution of this paper.

II. Literature

The literature on the effects of stadiums and sports on local economies began in earnest with papers by Robert Baade and Richard Dye (1988, 1990) and Baade (1996). Baade and Dye (1990) examined data covering 1965 to 1983 for nine cities and found that the effect of a stadium or franchise on the level of real income in those cities is uncertain. They also found that a stadium has a negative effect on a city's share of the region's income. Using a much larger sample than in Baade and Dye (1990), Baade (1996) found no effect on income. His focus then turned to the city's share of state employment in the amusement and recreation sector and in the commercial sports industry. Baade's analysis focuses on 10 cities covering periods from 1964–1989 for Cincinnati to 1977–1989 for Denver. The results are mixed. For some cities, the number of stadiums—or the number of teams—is positive and significant. For others, the variables are negative and significant or not significant. When the cities are pooled into a single sample, neither the number of teams nor the number of stadiums is statistically significant.

Coates and Humphreys (1999) criticize the methodologies used by Baade and Dye (1990) and Baade (1996) for two reasons. First, the models suffer from omitted variables bias. The analyses have too few controls for the circumstances of the local and national economies and, in the case of Baade (1996), treat all sports and all facilities as if they would have equal effects. Coates and Humphreys (1999) suggest that it is likely that a football stadium used for games fewer than 10 times a year would have a different effect than a baseball stadium used 81 times a year. Hence, they split the sports variables by sport and facility type. Second, the dependent variable is in many specifications defined as a share variable. An increase in the city's share of state or regional employment may mean that overall employment rose—just faster in the city than elsewhere—or it may mean that the city took jobs from the rest of the state or region. The latter possibility is good for the city but clearly bad for the rest of the state. However, the former is not necessarily good for anyone, even the city. Suppose the stadium or franchise effect is to reduce employment everywhere, but by more outside the city than within it. In such a case, the city's share of employment will rise, but the stadium or franchise will not benefit either the city or the state. For those reasons, Coates and Humphreys (1999) eschew share variables in their analysis, focusing instead on the level and growth rates of real personal income per capita in the metropolitan areas.

Since Coates and Humphreys (1999), the literature on the effect of franchises and sports facilities on local communities has expanded rapidly. Although the focus on changes in income remained (Gius and Johnson 2001; Nelson 2001, 2002; Wassmer 2001; Santo 2005; Rappaport and Wilkerson 2001; Lertwachara, K. and J. Cochran 2007; Austrian and Rosentraub 2002; Davis and End 2010), subsequent research also looked for effects (1) on employment and wages by sectors of the economy (Coates and Humphreys 2003, 2011; Hotchkiss, Moore, and Zobay 2003; Miller 2002); (2) on sales tax collections (Coates 2006; Coates and Depken 2009, 2011; Baade, Baumann and Matheson 2008); (3) on rents (Carlino and Coulson 2004; Coates and Gearhart 2008; Coates and Matheson 2011); (4) on property values (Tu 2005; Feng and Humphreys 2008; Humphreys and Feng 2012); and (5) on hotel occupancy rates (Lavoie and Rodríguez 2005). Analysis expanded to specific events, including all-star games, championships, and mega-events such as the Olympics or FIFA (Fédération Internationale de Football Association) World Cup (Hotchkiss, Moore and Zobay 2003; Madden 2006; Porter 1999; Porter and Fletcher 2008; Baade and Matheson 2001, 2004a, 2006; Coates and Humphreys 2002; Coates, 2006, 2012, 2013; Coates and Depken 2011; Matheson 2005; Coates and Matheson 2011; Leeds 2007); strikes and lockouts (Coates and Humphreys 2001; Zipp 1996); auto racing (Baade and Matheson 2000; Coates and Gearhart 2008); and collegiate events such as bowl games and the NCAA (National Collegiate Athletic Association) Men's Basketball Final Four Championship (Baade and Matheson 2004b; Baade, Baumann, and Matheson 2011; Coates and

Depken 2009, 2011). For more details on the literature, see Siegfried and Zimbalist (2000, 2006); Coates and Humphreys (2008), and Coates (2007).

Few studies have found evidence that sports franchises, stadium or arena construction, or hosting of events such as the Olympics, World Cup, or Super Bowl generate benefits measurable in greater incomes, employment, or tax collections across broad metropolitan area economies. The two most prominent of these studies are Carlino and Coulson (2004) and Hotchkiss, Moore, and Zobay (2003). Findings from both studies have been questioned, and the studies and their criticisms are discussed in detail. Carlino and Coulson (2004) use data from the 1993 and 1999 versions of the American Housing Survey to estimate a pseudo-panel model of rents in the 60 largest metropolitan areas. Their models include a dummy variable for the presence of an NFL team as well as an array of housing, neighborhood, and city characteristics variables. Focusing on their results for housing units within the central city of the metropolitan areas, they report that the presence of an NFL franchise induces about an 8 percent increase in monthly rent. Carlino and Coulson interpret this increase as a measure of the social benefit of the football team. However, when observations from outside the central city are included, the estimated impact of the franchise becomes statistically insignificant, with four of five point estimates negative. Coates, Humphreys, and Zimbalist (2006) criticize Carlino and Coulson's analysis of the central city observations for a variety of methodological issues, including the sensitivity of the results to inclusion or exclusion of some explanatory variables whose presence dramatically alter the sample size.

Hotchkiss, Moore, and Zobay (2003) find that the 1996 Atlanta Olympics had a beneficial effect on employment and wages. Using a difference-in-differences approach, they find that counties that hosted events or were near to counties that hosted events saw employment grow 17 percent faster than counties that neither hosted nor were near to counties that hosted events. Their results suggest smaller and statistically weaker effects on wages. One issue with this study is the authors' interpretation of their results. For example, their estimating equation includes a dummy variable for counties that hosted events or were near to counties that did so (*VNV*), a dummy variable that indicates the period after the event (*POST*),[1] and the interaction of these dummies (*VNV* × *POST*). The omitted category is, therefore, counties that were neither host counties nor near host counties in the period before the Olympics. In their table 1, Hotchkiss, Moore, and Zobay report the estimated coefficients on these variables as −0.2551 (*VNV*), 0.1788 (*POST*), and 0.1719 (*VNV* × *POST*), respectively, each of which is statistically significant at the 1 percent level or better. On the basis of the last coefficient, they conclude that employment increased 17 percent more in *VNV* counties than in non-*VNV* counties after the Olympics relative to employment in non-*VNV* counties before the Olympics. That observation is true, but it is misleading. Employment in the non-*VNV* counties grew faster after the Olympics than before the Olympics, also at a rate of about 17 percent, indicated by the coefficient on *POST*. In other words, relative to the non-*VNV* counties in the pre-Olympic period, both *VNV* and non-*VNV* counties had employment growth of about 17 percent; that is, hosting had no effect.

In their table 2, Hotchkiss, Moore, and Zobay (2003) report the results of interacting the *VNV*, *POST*, and *VNV* × *POST* variables with a linear time trend. For the log employment equation, the trend variable coefficient is 0.0035, the coefficient of the trend-*VNV* interaction is −0.0027, the coefficient of the trend-*POST* interaction is 2.1×10^{-5}, and that of the trend-*VNV* × *POST* interaction is 0.0018. Of these coefficients, only the trend-*VNV* and trend-*VNV* × *POST* coefficients are individually significant. Taken together, the coefficients indicate

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[1] In practice, this variable always took value of one for several quarters before as well as during and after the event.

that employment in host counties and counties near host counties trends downward before and after the Olympics, although less quickly after the Olympics.

Feddersen and Maennig (2013) also cast doubt on the findings of Hotchkiss, Moore, and Zobay (2003). First, rather than the quarterly data used by Hotchkiss, Moore, and Zobay, Feddersen and Maennig analyze monthly employment data. Consequently, their figures can focus more precisely on the time period of the event and the pre- and post-event periods. Second, Feddersen and Maennig have data by sector. Hence, the effects of hosting the Olympics can be traced to those sectors where they are most likely to occur, such as tourism, so that employment growth in unlikely sectors, such as manufacturing or financial services, is not attributed to the Olympics. Their conclusions are that (1) there is no persistent evidence of long-term employment boost attributable to the Olympics and (2) any increases that occurred were exclusively in Fulton County, the host to most of the events, during the month of the competition. Feddersen and Maennig's use of disaggregated data also reveals that the increased employment is limited to three sectors: arts, entertainment, and recreation; retail trade; and accommodation and food services.

The upshot is that doubt has been cast on the two most prominent academic pieces reporting positive general economic benefits: Carlino and Coulson (2004) and Hotchkiss, Moore, and Zobay (2003). Consequently, Coates, Humphreys, and Zimbalist (2006) and Feddersen and Maennig (2013) imply there is little evidence of general increases in income, wages and employment, tax collections, or rents and property values associated with the sports environment.

What other favorable evidence exists comes bundled with unfavorable evidence, as in the case of Baade and Dye (1990), described previously. Within a given city, although a broad-based benefit may be absent, localized benefits may exist. For example, property values near a stadium or arena may increase, as Tu (2005), Feng and Humphreys (2008), and Humphreys and Feng (2012) find. Each of these studies explicitly addresses the possibility that the effect of a stadium or arena may vary over the metropolitan area. In each case, property values are the dependent variable, with distance from a facility the explanatory variable of most interest. Each study finds that the closer to the facility a property is, the higher its property value will be. As distance from the facility grows, the boost to property value declines. Coates and Humphreys (2006) and Ahlfeldt and Maennig (2012) find support for this possibility in referendums on stadium subsidies that show that the likelihood of a favorable vote is greater in precincts closer to the facility than in precincts farther away.

Indeed, localized benefits of this sort form the basis for some recommendations for stadiums and arenas as effective methods of urban revitalization (Austrian and Rosentraub 2002; Rosentraub 2006; Cantor and Rosentraub 2012; Nelson 2002; Santo 2005). These studies suggest downtown revitalization is beneficial, even at the cost of losses imposed on citizens living outside the central city. Indeed, the studies argue that urban renewal in the central city benefits the entire metropolitan area, though not in ways that are reflected in personal income. Coates (2007), however, contends that this urban renewal argument is just one of several forms of justification for income redistribution associated with stadium and arena development projects.

III. Data

The data for this project come from multiple sources. The dependent variables in the analysis are personal income per capita, wage and salary disbursements, and wages per job, which come from the US Department of Commerce's Bureau of Economic Analysis (BEA) website. Coates and

Humphreys (1999) focus on personal income per capita and the growth in personal income per capita, but their subsequent work includes analysis of wages and salaries within specific sectors of the economy (Coates and Humphreys 2003) and analysis of earnings (Coates and Humphreys 2011). Wage and salary disbursements and wages and salaries per job are included in this analysis to enable focus on labor income as in these later studies.

The data cover the period 1969–2011 for each of 366 BEA metropolitan statistical areas (MSAs). These metropolitan areas are cities and all or parts of the economically integrated surrounding counties. The BEA consistently defines each area over the entire period by going back and adjusting the original data to be consistent with the modern circumstances. Of the 366 MSAs, 46 were home to a franchise in one or more of the American Basketball Association (ABA), MLB, Major League Soccer (MLS), NBA, NFL, or National Hockey League (NHL) for some period during the years from 1969 through 2011. Table 1 (page 29) lists the 46 MSAs that hosted a franchise; the remaining 320 MSAs are listed in an appendix that is available on the Internet or by request to the author.

Personal income per capita, wage and salary distribution, and wages per job are deflated using the national annual average of the CPI-U (consumer price index for all urban consumers), with 1982–1984 equal to 100. Table 2 (page 30) provides descriptive statistics for these income variables, for both the full sample and the host-city subsample. For the 366 MSAs over the time period, the average growth rate in real personal income per capita is 1.3 percent. The average level of real personal income per capita is $13,399 (over 15,738 local area–years, or 43 years for each of 366 MSAs). Mean growth in real personal income per capita in these 46 areas is 1.41 percent per year; mean real personal income per capita is $15,750. For areas that never had a franchise, the growth rate of real personal income per capita is 1.36 percent and mean real personal income per capita is $13,062. Average annual population in the areas that had franchises is 2.75 million; for those that never had a franchise the average annual population is 256,493. Average annual population growth rates are 1.30 percent for the areas that had franchises and 1.29 percent in areas that did not. Neither the growth rate of real personal income per capita nor the population growth rates are statistically significantly different between areas with and without franchises.

The explanatory variables in the models include the lagged value of the dependent variable, whether that variable is the level, the log, or the growth rate; population growth; an array of sports environment variables; city and year effects; or city-specific time trends. The sports environment variables are defined as in Coates and Humphreys (1999) with the addition of variables indicating NHL franchises, ABA franchises, and before and after hosting the Winter or Summer Olympics.

Each sport has a variable that indicates if an area hosted a professional team from that sport during a specific year. For example, in the New York City area, the MLB dummy variable will have a value of 1 in every year because the area had an MLB team in every year from 1969 through 2011. However, for the Washington, DC, area, the MLB dummy will be 1 for the years 1969, 1970, and 1971, when the Washington Senators played, and for the years 2005–2011, when the Washington Nationals played. But the MLB dummy will have a value of 0 for 1972–2004, the period when Washington, DC, was without an MLB franchise. Similar variables identify the years in which the areas had NFL, NBA, NHL, and MLS franchises. Note that no area had an MLS franchise before 1996, the year the league was founded. The analysis does not account for the presence of professional soccer clubs before 1996 although several short-lived leagues existed. Likewise, the analysis makes no accounting of the various short-lived football and hockey leagues, except the teams from those leagues that joined the NFL or NHL.

The ABA began play in the mid-1960s and competed against the NBA until the two leagues merged in the mid 1970s. Similarly, the American Football League (AFL) began play in 1960 and merged with the NFL in 1970. The two leagues agreed to a merger in 1966, with the creation of the Super Bowl being part of that merger agreement. However, the two leagues did not integrate their schedules until 1970. The analysis includes the ABA as a separate league for the few years of its existence in the early years of the data, and the cities that hosted teams in this league are so identified. For the period when the ABA joined the NBA, its existence is reflected in the NBA variable, and the ABA variable becomes 0. Those cities that did not join the NBA—Louisville and St. Louis—obviously have a value of 0 for the NBA variable. Because all the clubs from the AFL merged into the NFL and the agreement to merge came before 1969, the earliest year of our data, cities hosting AFL clubs in those early years are identified as having NFL clubs.

During the analysis period, areas acquired teams and lost teams. Areas that lost teams did so because an existing team moved to another area. Cities obtained teams either by attracting an existing team away from some other area or by being granted an expansion franchise. Cities and states have spent a great deal of money playing the stadium game. They have offered—or have been forced—to build a stadium to keep a team from leaving town or to bring a team to town, either through expansion or relocation of a franchise. The analysis includes variables that identify the year a team arrived in an area and the subsequent nine years. Other variables identify the year a franchise fled a location and the subsequent nine years. Franchises from all five sports relocated, and all the leagues expanded, so franchise arrival and departure indicators exist for all five sports. Variables for construction of a stadium or arena in each sport are also included. These too identify the first 10 years a facility is open. Stadium capacity and capacity squared are included for each sport as an indicator of whether a stadium has multiple uses (that is, houses both football and baseball teams or only one). Likewise, a variable identifies arenas that house both an NBA and an NHL franchise. A variable identifies those few team years in which a basketball club played in a domed stadium.

Finally, four variables identify the pre- and post-Olympic host periods for Los Angeles, Atlanta, and Salt Lake City. All four variables have a value of 1 in each of the two years before and after the event and in the year of the event. This overlap is done because identifying prior and posterior effects of a mid-year event is impossible with only annual data.

IV. Empirical Model

The empirical approach taken in this paper is to estimate a panel data model with and without clustered standard errors. Clustering is by the MSA and allows the error term for each MSA to have a unique variance. Clustering has no effect on coefficient estimates, but it does alter the standard errors of the estimates, thereby leading to potentially different inferences from hypothesis tests. Formally,

$$y_{it} = \alpha_i + \gamma y_{it-1} + \sum_j^J \beta_j \, x_{jit} + \partial_i t_i + \mu_t + \varepsilon_{it},$$

where y represents the outcome of interest (either the level, the log, or the growth rate of real personal income per capita; wage and salary disbursements; or wages per job); x represents the explanatory variables (such as the sports environment variables); t_i indicates an SMSA-specific time trend; α, γ, β, δ, and μ are parameters to be estimated; and ε is a random error with a mean of 0 and variance that may differ by metropolitan area i.

The model is intended to capture as much of the systematic variation in the dependent variable as possible with the nonsports variables. The lagged dependent variable and the SMSA fixed effects capture persistence in the dependent variable that may arise from the industrial structure, political organization and regulatory environment, geography and climate, and other local factors that either are time invariant or evolve only slowly. The purpose is to capture all those sources of income or wages and salaries that are inherent in the economic structure of the locality so that the sports variables do not inadvertently explain outcomes that are rightly attributed to other factors.

The model includes the lagged value of the dependent variable as well as SMSA fixed effects and SMSA-specific time trends, as does Coates and Humphreys (1999). Angrist and Pischke (2008) argue that models that include both fixed effects and lagged dependent variables require very stringent and unlikely assumptions for consistent estimation. Estimating the model with either lagged dependent variables or fixed effects imposes less stringent assumptions, but those models are not equivalent, nor is one model nested within the other. However, Angrist and Pischke (2008) demonstrate that estimates from the two models bound the true causal effect of the "treatment." Specifically, if the true model includes the lagged dependent variable but is mistakenly estimated with fixed effects, estimates of the causal effect will be larger than the true effects. Whereas if the true model is fixed effects but is mistakenly estimated with the lagged dependent variable, then the true effects are larger than the estimated effects. To maintain comparability with Coates and Humphreys (1999), this study estimates the equation with both fixed effects and the lagged dependent variable and with each separately to obtain the upper and lower bounds described by Angrist and Pischke (2008).

Consistent with Coates and Humphreys (1999), the null hypothesis is that all of the β attached to sports environment variables are 0, indicating that the sports environment has no effect on the dependent variable. The alternative hypothesis is that at least one of the sports coefficients is different from 0.

V. Results

It is important to determine whether the various measures of income in the sample are stationary. If they are not, then coefficient estimates will be biased and inconsistent, and inferences regarding the influence of sports on the local economy are unreliable. The panel unit root test of Im, Pesharan, and Shin (2003) is used to test for stationarity of the data. This test allows serial correlation in the variable being tested to be different for each MSA. In the test, the null hypothesis is that the data are nonstationary—that is, they have a unit root in each panel. The alternative hypothesis is that at least one panel is stationary. I test for stationarity on the full sample of MSAs and on the host-city subsample (that is, those host cities that had a franchise at some time during the data time period). I also test for stationarity of the natural logarithm and the annual growth rate of the real value of the dependent variables. Each model includes a trend, and separate unit root tests are conducted using one, two, and three lags of the dependent variable.

Table 3 (page 31) summarizes the panel unit root tests. In the full sample of 366 MSAs and the 46 host-city subsample of the MSAs, the level and the log of real personal income per capita are nonstationary, whereas the annual growth rate (computed as the difference in the log values from year to year) is stationary. Considering real wage and salary disbursements, the Im, Pesharan, and Shin (2003) tests reject the null of unit roots for all SMSAs in the full sample and in the host-city subsample, regardless of whether the variable is in level, logs, or growth rate. For the log of wages per job, the null hypothesis is not rejected in either sample but is rejected for levels and the growth rate.

Three dependent variables are possible, each of which is estimated in levels, logs, and growth rates. They are also estimated either with fixed city effects or with the lagged dependent variable as an explanatory variable, or with both. The models are estimated on the full sample of cities and the subsample of host cities. In addition, with year fixed effects and city-specific time trends, as well as the array of sports environment variables, each regression has a great many coefficient estimates. However, specific coefficients are not of particular interest, so the large array of estimates is in an appendix available from the author on request or on the Internet. The focus in this discussion of the results is on the joint significance of groups of sports variables: (1) the full set, (2) those indicating presence of a franchise, (3) those indicating entry, (4) those indicating exit, (5) those indicating stadium and arena capacity, (6) those indicating construction of new facilities, and (7) those indicating Summer or Winter Olympic host. Generally, the groups of variables are jointly significant, with the exception of the Olympic host group. The estimation results are also used to compute the sports and nonsports contributions to the dependent variables. These predictions consistently indicate that the sports contribution is relatively small and, in some cases, negative.

Tables 4 and 5 (pages 32 and 33) report *F*-statistics and *p*-values for joint hypothesis tests. First, the tables report the test of significance of the regression. In each case, the null hypothesis is easily rejected. More relevant for the purpose of this paper, the tables report the statistics for the null hypothesis (1) that all sports variables have zero coefficients, (2) that variables indicating the presence of a franchise have a zero coefficient, (3) that the franchise and stadium and arena capacity variables all have zero coefficients, (4) that the coefficients in item

(3) and all entry and exit variables have zero coefficients, and (5) that all coefficients in item (4) plus the facility construction variables all have zero coefficients. The tables also report the results for the null that the pre- and post-Olympic host variables all have zero coefficients. All test results are reported for both the host-city and full samples and for models using only city fixed effects or using only lagged values of the dependent variable. Results in tables 6 and 7 (pages 34 and 35) are not based on clustered standard errors.

The general finding of these tables indicates that the sports environment variables are generally statistically significant as a group, whether the model uses fixed effects or lagged dependent variables, as long as the dependent variable is wage and salary distributions or wages per job. Interestingly, one generally cannot reject the null hypothesis that sports variables have no effect when the dependent variable is personal income per capita. This finding differs from a finding of Coates and Humphreys (1999) that the sports environment variables as a group affect personal income per capita. In that analysis, errors are clustered by SMSA. When conducting F-tests using clustered errors, the present study's results indicate joint significance of the sports environment variables when personal income per capita is the dependent variable. Results for wage and salary disbursement and wages per job are the same whether errors are clustered or not.

Just as in Coates and Humphreys (1999), the finding that the sports environment affects income in the metropolitan area may not support the use of stadiums and arenas or professional sports franchises as tools for urban renewal and economic development. As will be explained, few of the individual variables are statistically significant, and those that are often have the wrong sign, thus indicating that the specific sports circumstance is linked to reductions rather than increases in the measure of income. Although sports is a determinant of personal income per capita, wage and salary disbursements, or wages per job, that does not mean sports raises those variables; joint significance does not mean that the sports environment is beneficial for the local economy. Tables 6 through 13 report on subsets of coefficients; tables 6 through 9 report on franchise presence and facility construction; and tables 10 through 13 report on entry and departure. Tables vary by whether the sample is host cities or all cities and whether the regression uses fixed effects or lagged dependent variables. The evidence from the individual coefficients is mixed across specifications and samples. Many variables are not individually significant, and they frequently have the wrong sign. It is common for them to be significant and of the wrong sign, thus suggesting a negative relationship between sports stadiums and the measure of income.

Stadium advocates often point to the facility as anchoring other development (Chema 1996; Santo 2005; Austrian and Rosentraub 2002; Nelson 2002). For example, a facility serves as the main attraction for attendance at the sporting events or at concerts and other types of entertainment, thereby providing an opportunity for other establishments to open or expand in the neighborhood. To assess this possibility, one must consider the effect over the first 10 years after construction of stadium or arena openings on the MSA. Whether the model is estimated with fixed effects or the lagged dependent variable, when all three possible dependent variables are taken into account, only 7 of 42 stadium construction coefficients are individually statistically significant at the 10 percent level or better in the host-city sample. All seven of these coefficients come from the fixed effects specification; none comes from the lagged dependent variable models. Interestingly, four of the seven are negative. If one looks only at point estimates and not at individual significance, 16 of 21 stadium or arena construction variables have negative signs in the lagged dependent variable models, and 14 of 21 have negative signs in the fixed effects specifications. Given these findings, the hypothesis that construction of a stadium or arena fosters the local economic development that construction advocates claim has little support. Nonetheless, perhaps comparing host cities to host cities is inappropriate; perhaps the better comparison is between host cities and nonhost cities.

In the full sample, with the lagged dependent variable as a regressor, 4 of 21 construction variables are individually significant at the 10 percent level or better. All four carry negative signs, and three of them relate to the NFL stadium construction. In the fixed effects specification, 7 of 21 construction variables have a statistically significant coefficient, and 4 are negative. If one looks only at point estimates and not at individual statistical significance, 13 of 21 coefficients are negative in the fixed effects specifications, and 14 are negative in the lagged dependent variable models. The evidence of a positive sign is a bit stronger in the full sample, in which hosts are compared to nonhosts, but the results still suggest construction has very little influence on personal income per capita, wage and salary distributions, or wages per job.

Advocates of stadium and arena construction often promote these policies as an attempt to attract a franchise or to keep an existing franchise from moving. The regression models include variables indicating the arrival or departure of a franchise. Support for sports as economic development would come in the form of positive effects of franchise entry or negative effects of franchise departure, or both. Tables 10 through 13 report the coefficients on these entry and exit variables for each sample, host cities or all cities; for each of the three dependent variables; and for each specification, either fixed effects of lagged dependent variables. Each table has 18 franchise entry variables. These variables capture the effect of a new franchise in a city in each of the first 10 years after the arrival of the franchise. In the host-city sample, only 1 of 36 entry variables is individually statistically significant, and that variable shows a negative effect for the entry of an ABA franchise on wage and salary disbursements. Among the point estimates, seven entry variables have a negative sign in the lagged dependent variable equation, and eight are negative in the fixed effects specification. The lack of individually significant coefficient estimates suggests that entry of franchises has no effect on personal income per capita, wage and salary distributions, and wages per job when host cities are compared to other host cities. Regarding the full sample, more support exists for the positive effects of franchise entry. In the fixed effects specification, five individual coefficients are significant at the 10 percent level or better, and four of those are positive. In the model with the lagged dependent variable, six individual coefficients are significant: three are positive, and three are negative. All of the negative coefficients relate to entry of an ABA franchise.

Over the run of the sample period, numerous franchises left one city for another. Dummy variables capture the effect of these departures over the first 10 years after the team leaves town. When fixed effects are used on the host-city sample, two of the five individually statistically significant departure variables have a negative sign, as would be the case if a franchise leaving town harmed the local economy. But three of those five have positive coefficients: departure of a franchise was beneficial in personal income per capita, wage and salary disbursements, or wages per job. In the lagged dependent variable models, only two coefficients are individually significant—one positive and one negative. Regarding the full sample with fixed effects, three of seven individually significant variables have negative signs; in the lagged dependent variable model only four variables are individually significant—two for each sign. The effect of franchise departure, given these results, is negligible, with a slight suggestion that a team leaving is beneficial in the various measures of income.

The final issue addressed is the contribution of sports to the local economy. Because groups of coefficients are jointly significant even though very few coefficients are individually significant, the overall contribution of sports to personal income per capita, wage and salary disbursements, or wages per job is calculated. Using the coefficients from the various models, one may compute the fitted portion of the dependent variable for each observation. The fitted portion is split into the contribution of sports and the contribution of everything else. Tables 14 and 15 (pages 42 and 43) report on these contributions: table 14 for the host sample and table 15 for the full sample. Looking first at the host-city sample, one sees that sports appear to make an enormous contribution to personal income per capita as the sports share is 0.22. That is, on average, a sport's contribution to personal income per capita is about 22 percent in the fixed effects model. However, this finding is misleading because this large value occurs in a model where the sports variables are not jointly statistically significant. In those cases where the sports environment variables are jointly significant, the sports contribution is generally quite small, with the largest contribution reaching only 4 percent. The results are much the same for the full sample of cities, except that no sports contribution exceeds 5 percent.

VI. Conclusion

The question of whether and to what extent the sports environment affects local economies has been discussed for years. Coates and Humphreys (1999) built on and extended existing work on the issue by pooling data from cities that hosted franchises in one or more of the NFL, NBA, and MLB over the period 1969–1996. Their evidence was that the overall effect of the sports environment was to reduce personal income per capita by a small amount. The current study updates Coates and Humphreys's analysis by extending the sample to include 1997–2011, incorporating both host and nonhost cities, and including the NHL and MLS in the analysis. Its findings are similar to the earlier findings. Specifically, the sports environment is a statistically significant factor in explaining personal income per capita, wage and salary disbursements, and wages per job. As in Coates and Humphreys (1999), few variables are individually statistically significant, and those that are often have the wrong sign. In other words, many of the individual coefficients are opposite to what proponents of stadium- and arena-led development would have hypothesized. That is, effects that proponents argue will be positive, such as stadium or arena construction and attracting a franchise, are frequently negative. Even when positive, these effects are generally quite small.

The results of using the models to forecast the contribution sports make to personal income per capita, wage and salary disbursements, and wages per job indicate sports play a role, but that role is small. The largest contribution sports have is less than 5 percent. As big as people perceive sports to be, the evidence here suggests sports franchises, stadium construction, and the other aspects of the sports environment, account for less than 5 percent of the economy, with most estimates under 1.5 percent and some even negative, on average.

Overall, the results here are consistent with and confirm the findings of Coates and Humphreys (1999) that sports-led development is unlikely to succeed in making a community richer. If the local government is looking for a policy to foster economic growth, far better candidate policies exist than those subsidizing a professional sports franchise.

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Table 1. Metropolitan Statistical Areas Hosting at Least One Professional Sports Franchise

Atlanta–Sandy Springs–Marietta, GA	Milwaukee–Waukesha–West Allis, WI
Baltimore–Towson, MD	Minneapolis–St. Paul–Bloomington, MN–WI
Boston–Cambridge–Quincy, MA–NH	Nashville–Davidson–Murfreesboro–Franklin, TN
Buffalo–Niagara Falls, NY	New Orleans–Metairie–Kenner, LA
Charlotte–Gastonia–Rock Hill, NC–SC	New York–Northern New Jersey–Long Island, NY–NJ–PA
Chicago–Joliet–Naperville, IL–IN–WI	Oklahoma City, OK
Cincinnati–Middletown, OH–KY–IN	Orlando–Kissimmee–Sanford, FL
Cleveland–Elyria–Mentor, OH	Philadelphia–Camden–Wilmington, PA–NJ–DE–MD
Columbus, OH	Phoenix–Mesa–Glendale, AZ
Dallas–Fort Worth–Arlington, TX	Pittsburgh, PA
Denver–Aurora–Broomfield, CO	Portland–Vancouver–Hillsboro, OR–WA
Detroit–Warren–Livonia, MI	Raleigh–Cary, NC
Green Bay, WI	Sacramento–Arden–Arcade–Roseville, CA
Greensboro–High Point, NC	Salt Lake City, UT
Hartford–West Hartford–East Hartford, CT	San Antonio–New Braunfels, TX
Houston–Sugar Land–Baytown, TX	San Diego–Carlsbad–San Marcos, CA
Indianapolis–Carmel, IN	San Diego–Carlsbad–San Marcos, CA
Jacksonville, FL	San Jose–Sunnyvale–Santa Clara, CA
Kansas City, MO–KS	Seattle–Tacoma–Bellevue, WA
Los Angeles–Long Beach–Santa Ana, CA	St. Louis, MO–IL
Louisville–Jefferson County, KY–IN	Tampa–St. Petersburg–Clearwater, FL
Memphis, TN–MS–AR	Virginia Beach–Norfolk–Newport News, VA
Miami–Fort Lauderdale–Pompano Beach, FL	Washington–Arlington–Alexandria, DC–VA–MD–WV

Table 2. Host-City and Full Sample Wage and Income Variables

	Observations	Mean	Standard deviation	Minimum	Maximum
Host-city sample					
Personal income per capita	1,978	$15,750.44	3,660.707	$8,509.54	$31,814.75
Growth rate of personal income per capita	1,932	0.0141	0.0006	n.a.	n.a.
Wage and salary disbursement	1,978	2.82E+07	3.46E+07	1,162,520	2.75E+08
Growth rate of wage and salary disbursement	1,932	0.0216	0.0008	n.a.	n.a.
Wage per job	1,978	19,648.12	3,245.565	14,324.5	43,172.48
Growth rate of wage per job	1,932	0.0053	0.0005	n.a.	n.a.
Full sample					
Personal income per capita	15,738	$13,399.46	3,292.067	$4,803.81	$38,650.64
Growth rate of personal income per capita	15,372	0.0136	0.0002	n.a.	n.a.
Wage and salary disbursement	15,738	5,258,417	1.52E+07	15,561.3	2.75E+08
Growth rate of wage and salary disbursement	15,372	0.0197	0.0003	n.a.	n.a.
Wage per job	15,738	$16,825.66	2,661.983	$10,926.4	$43,172.48
Growth rate of wage per job	15,372	0.0033	0.0005	n.a.	n.a.

Note: n.a. = not applicable.

Table 3. Im, Pesharan, and Shin (2003) Panel Unit Root Tests

	Full sample			Host sample		
	One lag	Two lags	Three lags	One lag	Two lags	Three lags
Levels						
Wage and salary	yes	yes	yes	yes	yes	yes
Wage per job	no	no	yes	10%	10%	yes
Personal income per capita	no	no	no	no	no	no
Logs						
Wage and salary	yes	yes	yes	yes	no	yes
Wage per job	no	no	yes	no	no	no
Personal income per capita growth rate	no	no	no	no	no	no
Wage and salary	yes	yes	yes	yes	yes	yes
Wage per job	yes	yes	yes	yes	yes	yes
Personal income per capita	yes	yes	yes	yes	yes	yes

Note: All models include a trend.

Table 4. Joint Hypothesis Tests: Host Cities

	Personal income per capita	Wage disbursement	Wages per job
Fixed effects model			
Regression	*f*(127,1759) = 21.5 *p* = 0.000	*f*(127,1759) = 291.2 *p* = 0.000	*f*(127,1759) = 218.8 *p* = 0.000
Sports	*f*(40,1759) = 1.19 *p* = 0.194	*f*(40,1759) = 14.25 *p* = 0.000	*f*(40,1759) = 9.50 *p* = 0.000
Franchise	*f*(6,1759) = 0.50 *p* = 0.808	*f*(6,1759) = 20.86 *p* = 0.000	*f*(6,1759) = 8.28 *p* = 0.000
and capacity	*f*(16,1759) = 1.47 *p* = 0.102	*f*(16,1759) = 17.38 *p* = 0.000	*f*(16,1759) = 8.76 *p* = 0.000
and entry and exit	*f*(28,1759) = 1.45 *p* = 0.061	*f*(28,1759) = 15.13 *p* = 0.000	*f*(28,1759) = 9.53 *p* = 0.000
and construction	*f*(36,1759) = 1.26 *p* = 0.144	*f*(36,1759) = 15.45 *p* = 0.000	*f*(36,1759) = 10.49 *p* = 0.000
Olympic host	*f*(4,1759) = 0.52 *p* = 0.723	*f*(4,1759) = 5.11 *p* = 0.000	*f*(4,1759) = 0.51 *p* = 0.728
Lagged dependent variable model			
Regression	*f*(127,1758) = 23.0 *p* = 0.000	*f*(128, 1803) = 11062 *p* = 0.000	*f*(128, 1803) = 1342.6 *p* = 0.000
Sports	*f*(35,1758) = 0.85 *p* = 0.714	*f*(35,1803) = 3.41 *p* = 0.000	*f*(35,1803) = 1.86 *p* = 0.002
Franchise	*f*(6,1758) = 0.63 *p* = 0.704	*f*(6,1803) = 3.86 *p* = 0.001	*f*(6,1803) = 1.88 *p* = 0.081
and capacity	*f*(11,1758) = 1.47 *p* = 0.135	*f*(11,1803) = 6.03 *p* = 0.000	*f*(11,1803) = 3.32 *p* = 0.000
and entry and exit	*f*(23,1758) = 1.02 *p* = 0.439	*f*(23,1803) = 4.02 *p* = 0.000	*f*(23,1803) = 2.63 *p* = 0.000
and construction	*f*(31,1758) = 0.89 *p* = 0.645	*f*(31,1803) = 3.11 *p* = 0.000	*f*(31,1803) = 2.06 *p* = 0.001
Olympic host	*f*(4,1758) = 0.52 *p* = 0.719	*f*(4,1803) = 3.11 *p* = 0.015	*f*(4,1803) = 0.04 *p* = 0.997

Table 5. Joint Hypothesis Tests: Full Sample

	Personal income per capita	Wage disbursement	Wages per job
Fixed effects model			
Regression	*f*(447,14559) = 18.28 *p* = 0.000	*f*(447,14559) = 534.1 *p* = 0.000	*f*(447,14559) = 156.0 *p* = 0.000
Sports	*f*(40,14559) = 1.82 *p* = 0.001	*f*(40,14559) = 137.7 *p* = 0.000	*f*(40,14559) = 15.78 *p* = 0.000
Franchise	*f*(6,14559) = 1.34 *p* = 0.236	*f*(6,14559) = 179.87 *p* = 0.000	*f*(6,14559) = 8.32 *p* = 0.000
and capacity	*f*(16,14559) = 1.39 *p* = 0.138	*f*(16,14559) = 135.43 *p* = 0.000	*f*(16,14559) = 9.37 *p* = 0.000
and entry and exit	*f*(28,14559) = 1.87 *p* = 0.004	*f*(28,14559) = 154.5 *p* = 0.000	*f*(28,14559) = 16.97 *p* = 0.000
and construction	*f*(36,14559) = 1.90 *p* = 0.001	*f*(36,14559) = 150.0 *p* = 0.000	*f*(36,14559) = 117.44 *p* = 0.000
Olympic host	*f*(4,14559) = 0.88 *p* = 0.476	*f*(4,14559) = 52.5 *p* = 0.000	*f*(4,14559) = 3.15 *p* = 0.014
Lagged dependent variable model			
Regression	*f*(447,14558) = 18.63 *p* = 0.000	*f*(448,14923) = 29819.4 *p* = 0.000	*f*(448,14923)= 2441.2 *p* = 0.000
Sports	*f*(35,14558) = 1.41 *p* = 0.053	*f*(35,14923) = 29.2 *p* = 0.000	*f*(35,14923) = 3.30 *p* = 0.000
Franchise	*f*(6,14558) = 0.90 *p* = 0.492	*f*(6,14923) = 20.87 *p* = 0.000	*f*(6,14923) = 1.18 *p* = 0.314
and capacity	*f*(11,14558) = 1.40 *p* = 0.167	*f*(11,14923) = 40.7 *p* = 0.000	*f*(11,14923) = 4.15 *p* = 0.000
and entry and exit	*f*(23,14558) = 1.53 *p* = 0.051	*f*(23,14923) = 32.88 *p* = 0.000	*f*(23,14923) = 4.52 *p* = 0.000
and construction	*f*(31,14558) = 1.48 *p* = 0.043	*f*(31,14923) = 25.52 *p* = 0.000	*f*(31,14923) = 3.63 *p* = 0.000
Olympic host	*f*(4,14558) = 0.79 *p* = 0.533	*f*(4,14923) = 30.71 *p* = 0.000	*f*(4,14923) = 0.16 *p* = 0.961

Table 6. Host Cities: Franchise and Construction, Fixed Effects Model

Variables	(1) Change in personal income per capita	(2) Wage and salary disbursement	(3) Real wage per job
NBA	−104.6548 (96.0675)	4,116,397.7820 (4,323,607.4276)	367.9608 (358.5183)
ABA	−35.6208 (88.7368)	2,519,881.9608 (2,815,276.6908)	−292.0209 (262.4471)
NFL	−323.7266 (227.0145)	−7.4051E+06 (5,232,056.8206)	−384.2332 (713.2571)
NHL	30.4582 (245.4469)	1,014,567.5412 (5,849,718.5190)	593.5832 (759.5773)
MLB	17.2736 (193.3550)	1.8852E+07** (7956904.1088)	1,368.2679 (1,089.5929)
MLS	−28.3871 (116.7188)	4957021.9552** (2,184,857.8294)	1,216.9289*** (428.3354)
NFL stadium construction	−39.2173 (38.0809)	−2.7246E+06** (1,220,715.4955)	−492.4542*** (130.9739)
MLB stadium construction	−53.4133 (33.4503)	325,878.0945 (653,315.6586)	77.6616 (115.6167)
MLS stadium construction	−108.2247 (107.7467)	−1.5118E+06 (1,083,580.3188)	−755.4758* (427.2313)
Multiuse stadium construction	−0.1724 (39.5473)	1,457,322.3010** (627,122.7355)	509.8530*** (164.5000)
Multiuse arena construction	−23.6353 (26.2798)	920,331.3549* (493,217.1326)	−27.6729 (79.1628)
NBA arena construction	−21.2687 (52.2598)	203,768.7106 (895,700.4845)	−247.3493 (276.0326)
NHL arena construction	54.1027 (114.6922)	−2.0045E+06 (1,748,688.1293)	−672.0961** (269.4698)
Baseball dome	155.6858 (122.7563)	−1.8559E+06 (2,279,727.9005)	−389.9245 (429.8359)
Constant	−5,776.4374 (5,186.0721)	−9.8307E+08*** (5.0472E+07)	−176716.6659*** (15,254.7748)
Observations	1,932	1,932	1,932
R^2	0.6086	0.9546	0.9405
Number of metro id	46	46	46

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: Robust standard errors are in parentheses.

Table 7. Full Sample: Franchise and Construction, Fixed Effects Model

Variables	(1) Change in personal income per capita	(2) Wage and salary disbursement	(3) Real wage per job
NBA	−133.5486 (92.5807)	4,634,787.4208 (4,212,081.6612)	626.8419* (379.3705)
ABA	−132.3844 (82.1019)	3,390,477.6772 (2,642,225.5819)	258.2765 (249.1933)
NFL	−284.8153 (243.2906)	−6.9263E+06 (5,801,641.1343)	−108.6683 (863.6475)
NHL	132.5467 (261.5995)	−1.7840E+06 (5644,940.0182)	−217.6784 (986.3920)
MLB	−236.7673 (183.3304)	2.2531E+07** (9,340,836.6741)	2,342.0561* (1,323.7554)
MLS	−293.1555** (113.7559)	4,328,156.4606* (2,320,199.0921)	1,201.2311*** (434.1128)
NFL stadium construction	−67.9489* (37.9104)	−2.0636E+06* (1,130,450.6904)	−406.5571*** (133.5954)
MLB stadium construction	−46.3573 (42.9894)	546,861.4420 (853,904.0380)	121.4057 (146.2311)
MLS stadium construction	−48.8799 (115.2357)	−1.1565E+06 (973,386.2990)	−700.0378 (450.3194)
Multiuse stadium construction	−21.2795 (39.3656)	1,525,976.3634** (618,123.8106)	596.2452*** (166.9907)
Multiuse arena construction	−17.3781 (24.9059)	1,151,363.2609** (460,752.5489)	48.7499 (84.8248)
NBA arena construction	19.6913 (37.2045)	−524664.0138 (1,241,377.6178)	−488.0831 (344.2237)
NHL arena construction	164.0710 (123.1811)	−1.3714E+06 (2,281,492.6010)	−516.9803* (305.6530)
Baseball dome	237.3557*** (90.3024)	−98,133.8088 (1,768,820.0388)	88.3954 (193.5076)
Constant	−3,934.6844*** (1,179.1385)	−1.8442E+08*** (6,490,511.8933)	−95,574.2549*** (4,031.3645)
Observations	15,372	15,372	15,372
R^2	0.3595	0.9425	0.8273
Number of metro id	366	366	366

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: Robust standard errors are in parentheses.

Table 8. Host Cities: Franchise and Construction, Lagged Dependent Variable Model

Variables	(1) Change in personal income per capita	(2) Wage and salary disbursement	(3) Real wage per job
NBA	−91.2054	−216911.7939	−33.0507
	(74.7954)	(314,134.9208)	(91.4077)
ABA	−21.1855	223,617.1503	75.1185
	(71.8285)	(266,885.1259)	(95.2229)
NFL	−249.6373**	−2.6364E+06*	79.0023
	(117.9079)	(1,319,529.2371)	(211.3031)
NHL	13.1806	2,509,144.8501**	592.9957***
	(178.8897)	(1,059,814.4329)	(191.4817)
MLB	−91.4836	484,421.3832	−193.9534
	(170.8657)	(1,773,989.7584)	(338.1242)
MLS	41.0601	−48,426.6547	227.5253
	(87.2801)	(785,732.4860)	(325.1317)
NFL stadium construction	−19.1025	−164,932.3617	−35.2228
	(26.5484)	(115,987.5612)	(33.4388)
MLB stadium construction	−34.9591	185,738.0177	0.6734
	(29.7946)	(232,837.3534)	(38.5476)
MLS stadium construction	−76.3969	−97,797.3659	−285.2736
	(53.5602)	(496,197.3908)	(191.1079)
Multiuse stadium construction	−43.5103	−118,568.8394	−25.5853
	(29.0448)	(207,698.2468)	(34.1715)
Multiuse arena construction	−23.5887	28,469.3425	−33.9389
	(20.0339)	(81,325.9441)	(28.4705)
NBA arena construction	−23.8342	−8,050.6115	−62.4136
	(54.0512)	(103,648.1603)	(77.3830)
NHL arena construction	26.6357	255,728.5256	−147.8187
	(101.3357)	(352,966.8021)	(127.2074)
Baseball dome	128.0214	417,183.6194	283.1062**
	(114.2356)	(460,432.9810)	(114.4332)
Constant	504.2758***	2,762,655.3288***	1,085.7551***
	(98.2885)	(758,975.3695)	(301.6410)
Observations	1,886	1,932	1,932
R^2	0.6245	0.9987	0.9896

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: Robust standard errors are in parentheses.

Table 9. Full Sample: Franchise and Construction, Lagged Dependent Variable Model

Variables	(1) Change in personal income per capita	(2) Wage and salary disbursement	(3) Real wage per job
NBA	−108.2047	−330,949.8334	−54.3298
	(73.2971)	(333,906.7356)	(95.7963)
ABA	−45.3324	−134,724.8825	−13.9271
	(67.1288)	(231,947.5183)	(78.2067)
NFL	−160.9266	−2.7598E+06*	49.7550
	(153.4618)	(1,439,918.1540)	(208.9894)
NHL	14.4553	1,731,453.6119*	443.7690***
	(188.9810)	(1,003,218.5510)	(160.1628)
MLB	−307.0639*	529,948.9206	−110.9532
	(171.6216)	(2,108,279.1332)	(283.5526)
MLS	−191.0844**	−613,118.2299	167.4681
	(92.2504)	(813,112.5901)	(312.7189)
NFL stadium construction	−51.4471*	−283,927.1402**	−79.4780**
	(30.5569)	(138,510.9029)	(34.6245)
MLB stadium construction	−33.9361	237,739.8880	12.3797
	(37.3613)	(256,856.0857)	(36.2519)
MLS stadium construction	−86.4304	46,770.2402	−288.3664*
	(66.9756)	(502,456.0116)	(172.1088)
Multiuse stadium construction	−47.1085	−203,940.9402	−41.5745
	(36.3140)	(227,557.2582)	(43.3892)
Multiuse arena construction	−19.9081	102,564.1843	−16.5485
	(21.3649)	(88,971.8426)	(25.4217)
NBA arena construction	−2.6433	92,883.9612	−18.1090
	(40.0138)	(162,400.7381)	(55.5087)
NHL arena construction	114.1454	331,210.7289	−125.2451
	(101.5826)	(556,715.1071)	(121.9085)
Baseball dome	202.8233**	1,155,317.9488*	396.1056***
	(84.9751)	(592,766.0011)	(86.5248)
Constant	240.7563***	−128,708.9093***	565.2179***
	(28.6380)	(20,259.8463)	(75.4583)
Observations	15,006	15,372	15,372
R^2	0.3639	0.9989	0.9865

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: Robust standard errors are in parentheses.

Table 10. Host Cities: Entry and Exit, Fixed Effects Model

Variables	(1) Change in personal income per capita	(2) Wage and salary disbursement	(3) Real wage per job
NBA entry	−4.6867	118,747.8788	93.6977
	(43.6732)	(958,066.5880)	(124.2664)
ABA entry	−34.0905	541,814.4977	62.9973
	(48.6206)	(668,301.1579)	(150.3428)
NFL entry	38.0112	1,137,173.0491	−0.2710
	(51.2328)	(949,834.2943)	(134.6794)
NHL entry	112.3184	−1.0860E+06	−165.6409
	(115.4138)	(723,407.1161)	(156.0281)
MLB entry	36.4638	−246,374.9024	72.9309
	(53.2911)	(641,778.8389)	(173.1318)
MLS entry	86.8986	−466,070.8015	−44.5812
	(73.0557)	(1,278,418.9166)	(144.6513)
NBA departure	−75.4628**	1,055,230.1387*	233.1461
	(36.8019)	(528,287.3775)	(172.6439)
ABA departure	16.8401	−843114.2483	−43.4863
	(43.6946)	(954,482.6720)	(165.8445)
NFL departure	4.9337	−1.2150E+06	−278.5257*
	(42.8937)	(753,746.5586)	(160.9237)
NHL departure	−92.5340	146,866.5356	118.4746
	(58.5971)	(661,531.0812)	(125.5651)
MLB departure	14.9011	722,174.7641	417.4300
	(132.1898)	(1,628,463.4734)	(347.1012)
MLS departure	280.2539**	2,216,112.0369	1,489.4912***
	(116.7840)	(2,206,277.1312)	(501.6031)
Constant	−5,776.4374	−9.8307E+08***	−176,716.6659***
	(5,186.0721)	(5.0472E+07)	(15,254.7748)
Observations	1,932	1,932	1,932
R^2	0.6086	0.9546	0.9405
Number of metro id	46	46	46

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: Robust standard errors are in parentheses.

Table 11. All Cities: Entry and Exit, Fixed Effects Model

Variables	(1) Change in personal income per capita	(2) Wage and salary disbursement	(3) Real wage per job
NBA entry	−41.3126 (43.4160)	−38,866.9012 (1,027,085.4521)	84.5369 (152.2399)
ABA entry	−122.6373** (54.8863)	1,252,948.3107* (710,526.8318)	328.7664** (163.1321)
NFL entry	58.6381 (49.2656)	1,630,477.3092* (987,079.5253)	174.9276 (143.7199)
NHL entry	100.4747 (114.9106)	−790875.4973 (748,833.7970)	−49.9983 (182.1748)
MLB entry	22.7123 (56.8853)	260,343.0932 (626,156.8946)	273.4829 (177.6975)
MLS entry	122.7944* (68.9813)	280,384.2864 (1,255,192.8857)	198.2687 (128.4241)
NBA departure	−99.4620** (48.8001)	988,277.4271* (579,591.9711)	152.9965 (161.5565)
ABA departure	22.2268 (45.2357)	−1.2128E+06 (891,391.7695)	−262.6914** (119.8485)
NFL departure	38.9675 (44.8635)	−1.1159E+06 (750,731.7508)	−294.2821* (172.8940)
NHL departure	−15.7263 (58.4976)	461,355.3113 (654,389.4571)	106.8320 (135.4483)
MLB departure	−36.2896 (118.3784)	1,770,029.4314 (1,510,598.8419)	875.3862*** (247.6373)
MLS departure	31.8934 (104.6009)	3,104,169.4538* (1,838,032.1948)	1,686.0535*** (526.3579)
Constant	−3,934.6844*** (1,179.1385)	−1.8442E+08*** (6,490,511.8933)	−95,574.2549*** (4,031.3645)
Observations	15,372	15,372	15,372
R^2	0.3595	0.9425	0.8273
Number of metro id	366	366	366

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: Robust standard errors are in parentheses.

Table 12. Host Cities: Entry and Exit, Lagged Dependent Variable Model

Variables	(1) Change in personal income per capita	(2) Wage and salary disbursement	(3) Real wage per job
NBA entry	21.8316	−80,383.4520	37.6349
	(30.7937)	(114,359.4773)	(32.0963)
ABA entry	−20.0358	−419,672.5108**	−47.2087
	(39.5440)	(168,939.9950)	(38.2803)
NFL entry	32.2113	176,653.5595	24.4756
	(30.0589)	(155,873.8990)	(29.7375)
NHL entry	72.7242	−24,045.3434	105.0354
	(88.0863)	(249,270.5030)	(118.9384)
MLB entry	41.9227	−195,831.1301	−37.9926
	(36.3047)	(222,390.0523)	(50.9733)
MLS entry	38.4013	334,859.1161	16.2339
	(44.4727)	(240,542.7441)	(56.1231)
NBA departure	−62.4345**	134,301.8526	−35.9643
	(24.0643)	(126,036.1508)	(41.2176)
ABA departure	14.2042	257,395.7527**	32.7748
	(30.7905)	(102,603.6502)	(30.9459)
NFL departure	−6.8859	148,638.9116	−23.8589
	(30.1260)	(188,271.5206)	(35.4367)
NHL departure	−74.9118	−295,326.2716	−50.7439
	(49.5892)	(207,963.7240)	(55.3306)
MLB departure	−53.5240	36,099.0158	−18.7294
	(77.3623)	(442,000.6378)	(103.3347)
MLS departure	71.9080	454,382.8025	409.0385
	(80.6160)	(503,914.2435)	(318.5580)
Constant	504.2758***	2,762,655.3288***	1,085.7551***
	(98.2885)	(758,975.3695)	(301.6410)
Observations	1,886	1,932	1,932
R^2	0.6245	0.9987	0.9896

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: Robust standard errors are in parentheses.

Table 13. All Cities: Entry and Exit, Lagged Dependent Variable

Variables	(1) Change in personal income per capita	(2) Wage and salary disbursement	(3) Real wage per job
NBA entry	−6.4600 (30.3345)	−185,198.6608 (121,048.4867)	−15.2387 (32.2174)
ABA entry	−96.7646** (40.6100)	−436,344.1950** (178,832.8040)	−113.9804*** (36.2121)
NFL entry	52.8248 (34.8344)	343,103.0973** (159,053.4946)	22.4574 (31.9131)
NHL entry	83.4060 (89.0886)	−12,835.3831 (243,464.8695)	89.3183 (118.7011)
MLB entry	43.8192 (39.0340)	−145,979.5870 (249,235.7867)	−51.0241 (43.7265)
MLS entry	117.6954** (48.0505)	477,167.6093* (267,520.8434)	68.6162 (50.9199)
NBA departure	−97.9523*** (33.1212)	−27,997.1268 (131,716.3735)	−88.5913** (40.2897)
ABA departure	53.0995** (26.5405)	32,056.7711 (95,292.2243)	−29.7364 (29.0117)
NFL departure	31.8598 (40.0298)	403,040.3642* (216,194.3057)	45.5440 (36.2852)
NHL departure	−23.6935 (59.1979)	−157,170.3440 (215,384.4744)	−24.5742 (66.6540)
MLB departure	−62.9600 (52.9031)	−162,153.2648 (375,259.9410)	−49.8586 (67.5005)
MLS departure	−9.3065 (77.2178)	211,197.9538 (593,772.5344)	290.9416 (256.9550)
Constant	240.7563*** (28.6380)	−128,708.9093*** (20,259.8463)	565.2179*** (75.4583)
Observations	15,006	15,372	15,372
R^2	0.3639	0.9989	0.9865

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Note: Robust standard errors are in parentheses.

Table 14. Sports and Nonsports Contributions: Host Cities

	Observations	Mean	Standard deviation	Minimum	Maximum	Share
Personal income per capita						
Fixed effects model						
Sports contribution	1,932	46.9603	96.99346	−231.774	573.1055	0.223168
Nonsports contribution	1,932	163.4657	371.8432	−1,614.78	2,313.909	0.776832
Total	1,932	210.426	368.3787	−1,344.38	2,353.535	
Lagged dependent variable model						
Sports contribution	1,886	−41.0332	68.44451	−227.379	256.2837	−0.19211
Nonsports contribution	1,886	254.6213	374.1228	−1,559.24	2,469.638	1.192114
Total	1,886	213.5881	374.8935	−1,563.94	2,434.95	
Wage and salary disbursement						
Fixed effects model						
Sports contribution	1,932	1,136,268	244,4381	−9169303	1.72E+07	0.040009
Nonsports contribution	1,932	2.73E+07	3.43E+07	1,059,716	2.69E+08	0.961268
Total	1,932	2.84E+07	3.47E+07	−314,705	2.63E+08	
Lagged dependent variable model						
Sports contribution	1,932	555,500.5	1,395,228	−890,644	1.08E+07	0.01956
Nonsports contribution	1,932	2.79E+07	3.35E+07	540,350	2.66E+08	0.982394
Total	1,932	2.84E+07	3.47E+07	161,801	2.76E+08	
Wages per job						
Fixed effects model						
Sports contribution	1,932	240.1752	485.4283	−1167.6	3,002.072	0.012202
Nonsports contribution	1,932	19,443.6	3,039.253	14,321.9	37,808.07	0.987799
Total	1,932	19,683.77	3,215.625	14,695.7	40,810.14	
Lagged dependent variable model						
Sports contribution	1,932	−7.0904	91.34851	−299.383	644.9659	−0.00036
Nonsports contribution	1,932	19,690.86	3,215.833	14,368.7	42,751.94	1.00036
Total	1,932	19,683.77	3,243.163	14,368.7	43,033.35	

Table 15. Sports and Nonsports Contributions

	Observations	Mean	Standard deviation	Minimum	Maximum	Share
Personal income per capita						
Fixed effects model						
Sports contribution	15,372	6.80723	50.19974	−282.627	554.2646	0.039114
Nonsports contribution	15,372	167.229	263.1834	−1,106.85	1,353.827	0.960886
Total	15,372	174.036	262.3328	−1,034.24	1,388.484	
Lagged dependent variable model						
Sports contribution	15,006	−4.18198	33.6101	−333.458	326.5678	−0.02373
Nonsports contribution	15,006	180.379	261.9213	−943.767	1,314.54	1.023734
Total	15,006	176.197	261.8191	−998.612	1,266.07	
Wage and salary disbursement						
Fixed effects model						
Sports contribution	15,372	258,286	1,254,388	−7,180,484	2.08E+07	0.048701
Nonsports contribution	15,372	5,045,262	1.46E+07	−298,094	2.69E+08	0.951299
Total	15,372	5,303,548	1.52E+07	−298,094	2.63E+08	
Lagged dependent variable model						
Sports contribution	15,372	87,552.3	603,477.8	−894,144	1.21E+07	0.016508
Nonsports contribution	15,372	5,215,996	1.47E+07	−286,917	2.66E+08	0.983492
Total	15,372	5,303,548	1.52E+07	−286,917	2.77E+08	
Wages per job						
Fixed effects model						
Sports contribution	15,372	47.9428	257.3305	−1,372.13	3,188.936	0.002846
Nonsports contribution	15,372	16,795	2,517.368	11,151.86	37,843.65	0.997154
Total	15,372	16,843	2,597.711	11,151.86	40,893.31	
Lagged dependent variable model						
Sports contribution	15,372	5.92267	45.06052	−272.824	574.9037	0.000352
Nonsports contribution	15,372	16,837	2,631.192	10,950.95	42,879.2	0.999649
Total	15,372	16,843	2,647.791	10,950.95	43,267.76	