Metropolitan Prosperity From Major League Sports in the CBD: Stadia Locations or Just Strength of the Central City? A Reply to Arthur C. Nelson

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This comment on Nelson's article, "Prosperity or Blight? A Question of Major League Stadia Locations," which appears in this issue of Economic Development Quarterly, *looks at the possible economic contribution of professional sports to a metropolitan area by summarizing earlier critiques of the literature on the topic, three regression studies that are similar to Nelson's, and an article that relates central-city economic vitality to suburban economic vitality. The possibility of omitted variable bias in Nelson's analysis is raised and the appropriate caution provided that sports stadia in a central business district may only be acting as a proxy for the overall strength of the central city. Nelson is commended for the work he has done, but more work along this line needs to be completed before specific public policy toward the desired locations of professional sports stadia is set.*

When I first read the abstract for Arthur Nelson's (2001, [this issue]) article, I was intrigued by the prospect of finding an empirical analysis that shows that locating a major league sports venue in a central city's central business district (CBD) contributes more to a metropolitan area's economic vitality than if the same venue had located outside the CBD. Like Nelson, I like the new (but old-looking) baseball stadiums that have recently been built or are being built in or very near the CBD of some U.S. central cities (e.g., Baltimore, Cleveland, Denver, and Detroit). I also enjoy the complete entertainment package that is possible by combining downtown attendance at a professional sporting event with the amenities that most central-city CBDs offer, although, I must confess, I am also an urbanist who for social, economic, and personal reasons would like to see more central cities in the United States with vibrant CBDs. I thought to myself, here is a paper that uses real-world data to show not only that building professional sports venues downtown aids in the revitalization and continued strength of a central city's CBD but that a central location also contributes more to the economic well-being of the entire metropolitan area than if the arena or stadium were not built downtown. If the research methods are appropriate, Nelson's work will be a major contribution to the continuing policy debate on this issue.

I had followed this line of research even before reading "Prosperity or Blight?" and had in mind the three conditions necessary to allow me to fully trust the results of an empirical study of the relationship between stadia location and the economic vitality of a metropolitan area. The first condition is the appropriate choice of a dependent variable. The second condition is the inclusion of all the relevant explanatory variables that control for differences in the chosen dependent variable. The third condition is the realization that interrelationships may exist among explanatory variables, and if they do, appropriate statistical methods are called for. After closely reading Nelson's article, I am convinced that he has satisfied, through his use of share of state personal income attributable to a metropolitan statistical area, my first condition. Unfortunately, I am less than fully

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convinced that Nelson has entirely satisfied my last two conditions. I will explain why I feel this way later in this comment. But to strengthen my explanation, let me first draw on critiques by Edwin Mills (1996) and Timothy Bartik (1998) that take a careful look at the contribution that professional sports activity can make to a metropolitan area. Second, I want to summarize an article by Dennis Coates and Brad Humphreys (1999) that offers comparable findings and raises empirical issues relevant to the interpretation of Nelson's results. Finally, as evidence for an alternative interpretation of Nelson's CBD stadia findings, I call on Richard Voith's (1998) empirical work that relates central-city income growth to suburban income growth.

ECONOMIC EFFECTS OF STATE AND LOCAL GOVERNMENT CAPITAL PROJECTS

In the *Illinois Real Estate Letter*, Mills (1996) provided an insightful commentary that he titled the same as this section. Unabashedly, he appraises the assumptions that most consultants use to forecast the income and employment increases that accrue to a metropolitan area when a local government underwrites the building of a professional sports arena or stadium—no matter where it is built. Mills's critique is a relevant comment on "Prosperity or Blight?" because Nelson's analysis is in part an ex post examination of the empirical validity of the ex ante conclusion of the large local impact that is found in most private analyses of the effect of a sports venue.

Whether it is publicly or privately financed, a metropolitan area receives the same benefits from an arena or a stadium. Nevertheless, usually at least a portion of the $100 to $500 million cost of a new arena or stadium is funded with public dollars. The reason is that owners of professional sports teams have been effective at threatening city officials with alternative locations. One important issue, then, is whether the employment and income benefits from the new sports facility are greater than the public cost. Mills dismissed much of the employment benefit from a new stadium because in the United States, 90% to 95% of the new stadium's labor force was usually employed in the metropolitan area before the stadium was built. He believed that the trivial increase in employment opportunities from a professional sports venue is felt primarily through a slight increase in wages and/or only a miniscule increase in migration to fill new jobs.

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Regarding metropolitan-wide income increases that could occur from stadia, Mills, like most economists, stressed the importance of counting only spending that would not have occurred in the absence of the sports venue. This new spending arises from individuals traveling from outside the metropolitan area to see a sporting event and they would not have come to the area without it. New spending also arises from residents of the metropolitan area spending entertainment dollars that they would have normally spent outside the area. Once this value of export sales is calculated, it needs to be increased by an appropriate multiplier that accounts for the ripple effect of spending and respending a new dollar in a metropolitan area. Although it is difficult, due to lack of good data, to know exactly how much a dollar of initial spending ripples through a metropolitan economy, Mills was certain there are more leakages than assumed by the typical multiplier used by consultants. Perhaps most important to the calculation of an appropriate multiplier is the nearly always ignored fact that local public dollars used to finance a stadium or arena require an increase in local taxes or a decrease in local expenditure. Either choice results in negative multiplier effects that offset the positive multiplier effect of increased export sales due to the venue. Mills suggested that an overall multiplier of 0.5 is more appropriate than the multiplier range of 1.5 to 2.0 usually used. The implication of this conclusion to studies such as Nelson's is that the smaller the effect of a sports venue, the more difficult it is to tease out the effect it may have on a metropolitan area.

ECONOMIC IMPACT OF SPORTS TEAMS AND STADIUMS

Stressing some of the same points as made by Mills, Bartik (1998) offered an instructive evaluation of the 15 studies contained in Roger Noll and Andrew Zimbalist's (1997) edited volume *Sports, Jobs, and Taxes: The Economic Impact of Sport Teams and Stadiums*. Bartik pointed out the two recurrent themes throughout Noll and Zimbalist: (a) Professional sports stadiums offer smaller benefits to regions than is commonly believed, and (b) the distributional impact (poor to rich) of local governments subsidizing professional sports stadiums is troubling. This first theme again reinforces the difficulty of empirically finding the effect of a stadium or arena in a metropolitan area. Because Bartik found compelling the logic used throughout *Sports, Jobs, and Taxes* to argue that sports stadiums can exert only a modest impact on a metropolitan area, he found less compelling the studies in the book that attempt to tease out their effect. Nelson's research is also relevant to the second theme throughout Noll and Zimbalist's book because the finding that a CBD location exerts a significant influence on metropolitan activity, whereas a non-CBD location does not, may alleviate some of the reverse Robin Hood results of stadia subsidy.

GROWTH EFFECTS OF SPORT FRANCHISES, STADIA, AND ARENAS

Coates and Humphreys (1999) have also completed a study of the effect of professional sports on U.S. metropolitan areas. The reason I mention it in this comment is that Nelson, as well as Coates and Humphreys, traced the motivation for their work to the earlier research of Robert Baade and Richard Dye (1990). Baade and Dye used a sample of just nine different metropolitan areas observed over 29 years (1965 to 1983) to estimate the impact of stadiums and professional sports on level of personal income in metropolitan areas and metropolitan development relative to a multistate region. They found that the presence of a new or renovated stadium in a metropolitan area has an uncertain impact on personal income and a negative impact on relative development. As he explains in his article, Nelson had chosen to further investigate the latter findings of Baade (1996), which indicate that CBD arena or stadium location may exert an effect on relative metropolitan economic ctivity that is different from that of a non-CBD location. Instead, Coates and Humphreys chose to extend the methodology of Baade and Dye to examine the separate effects of the entry and departure of professional football, baseball, and basketball franchises, and the construction and capacity of arena and stadia.

Like Nelson, Coates and Humphreys (1999) used a larger data set (37 metropolitan areas observed yearly between 1969 and 1994) than that in Baade and Dye's (1990) original work. Unlike Nelson, or Baade and Dye, Coates and Humphreys chose to use the level of metropolitan per capita income and its growth rate as dependent variables. Employing a regression methodology that includes time and metropolitan area dummies, lagged or average value of dependent variables, percentage of change in population, and dummies representing important events in professional sports (i.e., first basketball franchise entered, second basketball franchise entered, basketball arena constructed in the past 10 years, any basketball franchise entered in the past 10 years, any basketball franchise left in the past 10 years, capacity of basketball arena, and the same measures for baseball and football). Coates and Humphries reached two primary conclusions: (a) Professional sports in a metropolitan area exert no effect on the growth rate in real per capita income in the area, and (b) some events in professional sports actually reduce the level of real per capita income in a metropolitan area.

Coates and Humphreys also reported that in the reduced-form methodology both they and Nelson used, the size and significance of the sports environment on the level of metropolitan income depends on the regression specification. They also stated, "Our results do not invalidate the contribution of sports to the sense of community and overall satisfaction enjoyed by residents in a metropolitan area" (p. 622). Thus, even Coates and Humphreys left open the possibility that professional sports can make a metropolitan area more attractive to residents and business. If this is the case, Nelson's finding that sports activity in the CBD increases the percentage share of metropolitan economic activity relative to state economic activity is still possible. It is unfortunate that Coates and Humphrey did not choose to use Nelson's measure of metropolitan strength as a third dependent variable in their regression tests.

DO SUBURBS NEED CITIES?

A final empirical study I wish to mention before commenting directly on Nelson's article is the work of Richard Voith (1998). Voith's research directly examined the influence that an economically vital central city exerts on the economic strength of the entire metropolitan area. His most basic concern is the interdependence of city and suburban economies. I raise this concern because I fear that it is an issue that Nelson has not fully dealt with in "Prosperity or Blight?"

Voith developed a structural regression model that relates central-city income growth to suburban income growth in income, population, and house values for metropolitan statistical areas in the United States in 1960, 1970, 1980, and 1990. As is necessary, he controlled for the bidirectional effects that city income has on his various measures of suburban strength. He also controlled for observed and unobserved influences on city and suburban income, population, and house values. In regression analyses that allow for central-city income growth to have different effects on suburban income growth, suburban house price, and suburban population, Voith convincingly found that a large (greater than 500,000 population) central city's income growth exerts a positive and statistically significant influence on suburban income and house price. The influence from a medium central city (population between 300,000 and 500,000) is also positive but not statistically significant. For a small central city, the influence of central-city income growth on suburban house price and population is negative but statistically insignificant from zero.

Voith's findings suggest a positive relationship between large central cities and their surrounding suburbs. That is, vibrant central cities contribute to a more vibrant metropolitan area. Voith did not explicitly test the hypothesis, but a vibrant central city is more likely to have a vibrant central business district. If professional sports franchises are more likely to play in stadia in a CBD if the entire central city is more vibrant, perhaps there is an alternative explanation for Nelson's finding that a CBD location contributes to a metropolitan area's capturing a greater share of state income.

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STADIA LOCATION OR JUST STRENGTH OF CENTRAL CITY?

As is clear from my sample of previous thinking on the influence that professional sports can exert on a metropolitan economy, the theoretical consensus in the academic literature is that the effect of spending on or at a professional sports arena or stadium is small. As both Mills (1996) and Bartik (1998) pointed out, this makes it difficult to tease the direct effect of stadia out of a metropolitan area's total income or growth in income. The empirical findings of Baade (1996), Baade and Dye (1990), and Coates and Humphreys (1999) confirm this belief. However, it is still possible that the location of professional sports franchises in a metropolitan area can increase the sense of community and satisfaction enjoyed by residents in the area. Professional sports could make a large metropolitan area a more attractive place to be for both individuals and business and perhaps raise the share of income generated in the metropolitan area relative to the rest of the state. As Nelson pointed out, Baade's work offers some weak evidence in support of this. Nelson's research is an attempt to strengthen Baade's findings by specifically looking for the professional sports' effect on relative wealth when a stadium is located in the central city's CBD.

Let me now comment on "Prosperity or Blight?" by focusing on the two remaining conditions I believe are necessary to fully trust Nelson's empirical finding that when major league stadia locate in the CBD, the metropolitan area's share of state wealth increases and that share rises as more major league teams play there. My major concern is the possibility that Nelson left out an important explanatory variable. The absence of a relevant explanatory variable results in what econometricians refer to as "omitted variable bias." When a factor that causes a dependent variable is left out of a regression and that factor is correlated with a factor that is included as an explanatory variable, then the effect calculated for the included variable is biased or cannot be trusted. If the correlation is positive, the bias is going to result in an overestimate of the included variable's influence.

Voith (1998) has shown that a stronger (in economic terms) large central city results in a stronger suburban region surrounding the city. If this is the case, there is a need in Nelson's regression

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analysis for explanatory variable(s) that proxy for differences in the relative strength of central cities across U.S. metropolitan areas. I can think of variables such as city's income, poverty rate, or unemployment rate relative to the same measures in the metropolitan area that could do this. If sport venues are more likely to locate in a CBD when the central city itself is relatively strong economically in regard to the metropolitan area, dummies that measure CBD location of arenas or stadiums may in fact, at least in part, be positively picking up the influence of the strength of the central city.

An additional explanatory variable concern, although minor compared to the first, is that in Nelson's regression Equation 2, he has included dummy variables that represent two teams in a CBD and three teams in a CBD; two teams at CBD edge, three teams at CBD edge, four teams at CBD edge; and similar measures (two through four) for teams elsewhere in central cities or in suburbs. As appropriate, he leaves out one category for each of these sets of dummies. This category is zero or one team playing in CBD, CBD edge, elsewhere in the city, or in suburbs. Is it the case that you need more than one team playing in a CBD before you get the positive influence on metropolitan share of total state personal income, or is this a modeling oversight on Nelson's part? Why not include one team playing in an area and have no teams as the excluded category? Clarification is needed on this issue.

The other condition that concerns me does not exist in Nelson's current analysis but would arise if my suggestion of including a measure of central-city strength is followed. Such a measure must be considered endogenous. Some of the same factors that influence central-city strength must also influence metropolitan area strength relative to the entire state. As Voith (1998) did, the solution is to construct structural models of both Nelson's current dependent variable and the chosen measure(s) of central-city strength. As is required in the two-stage regression process this leads to, the researcher needs to find exogenous variables that affect each of the endogenous variables but do not affect the other endogenous variables. Admittedly, this is not an easy task. But, as Voith demonstrated, it is possible.

CONCLUSION

I must conclude by commending Nelson on his recognition from urban theory and, from the empirical evidence offered by Baade, that the strong possibility exists that a professional sports venue located downtown offers greater economic benefits to a metropolitan area than does one located elsewhere. As I have already stated, for purely normative reasons, I would also like to believe this to be true. Nelson has taken the necessary step of providing additional positive evidence in support of it. But as I teach my public policy students in an applied course on regression analysis, never base policy on the findings of one regression analysis. And, as Coates and Humphreys (1999) have shown, the results of an empirical determination of the influence of professional sports in a metropolitan area can vary by regression specification. I encourage other researchers to continue the line of empirical inquiry begun by Nelson and, in doing so, consider the suggestions that I have offered here, for if Nelson's findings are upheld in further regression tests, there are clear public policy suggestions to be made regarding the use of government subsidies to steer professional sports stadia to central locations.

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