

VALUE OF PUBLIC GOODS FROM SPORTS STADIUMS: THE CVM APPROACH

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Many state and local governments have subsidized the construction of arenas and stadiums for the use of professional sports teams. They often justify the subsidies by claiming the projects generate valuable public goods and positive externalities, though such benefits are difficult to measure. This article reports an application of the contingent valuation method (CVM) to measure the value of public goods generated by two proposed projects in Lexington, Kentucky: a new basketball arena for the University of Kentucky and a minor league baseball stadium. Neither project would generate sufficiently valuable public goods to justify public financing. Although the results cannot be generalized to other cases, they do shed light on some of the main issues involved, and they demonstrate the feasibility of applying CVM to the evaluation of subsidized stadiums. (JEL H41, L83)

I. INTRODUCTION

The 1990s have seen a surge in sports stadium and arena building. In mid 1996, the total spending completed and planned for the decade topped \$9 billion, with more than 80% of the funding provided by state and local governments (*USA Today*, 1996). Even more new sports building projects have been approved since 1996, and others have been proposed but not yet funded. For instance, Raleigh, North Carolina, agreed to build a new arena to attract a hockey team, and both the Yankees and the Mets have asked New York City to build new stadiums for them.

The building boom continues a trend begun in the 1950s. Most major league sports teams played in privately owned buildings in 1950, including 15 of the 16 baseball teams. By 1989, however, 77 of the 100 teams in major league baseball, football, basketball,

and hockey played in publicly owned buildings (Quirk and Fort, 1992, pp. 131–133).

Although building stadiums and arenas has become popular among state and local governments, it has not proven financially lucrative for them. Quirk and Fort (1992, pp. 168–172) show that publicly funded sports buildings invariably fail to generate sufficient income for their owners to cover their total opportunity costs. Some fail even to cover their variable costs of operation.

Why, then, have so many governments built stadiums and arenas? In most cases, they have hoped to attract a new team or to prevent an existing team from leaving. Proponents of public stadiums claim the positive externalities of teams and the stadiums that make them possible are so powerful that total benefits of new stadiums exceed total costs. But because many of the benefits derive from externalities, no private investor could hope to capture enough of the benefits to justify constructing a stadium. Unless the government builds the stadium, then, a city

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ABBREVIATIONS

CVM: Contingent Valuation Method
NCAA: National Collegiate Athletic Association
NUV: Nonuse Value
UK: University of Kentucky
UV: Use Value
WTP: Willingness to Pay

could be worse off if it lost its team as a result. Of course, some teams do finance their own buildings and, presumably, expect to earn a profit. Recent examples include the Chicago Bulls, the Washington Redskins, and the Montreal Canadiens.

The positive externalities allegedly generated by sports teams create two types of benefits, indirect and direct. The indirect benefits arise if team- and stadium-related activities cause a net increase in an area's aggregate income. If, for instance, a new stadium attracts more tourists to town, production of hotel services, restaurant meals, and so on, will increase and, through a multiplier effect, will generate additional increases in income. But much of the increased income will accrue to firms other than the team.

The overwhelming weight of objective, scientific evidence suggests that stadiums do not generate significant increases in income. Economic impact studies purporting to justify public stadium financing suffer from serious flaws (Shropshire, 1995). Baade and Dye (1990), Noll and Zimbalist (1997), and Rosentraub (1996), among many others, demonstrate that stadiums and teams fail to generate measurable growth in regional economies.

Direct benefits, the second type allegedly generated by teams, arise because teams produce public goods. Whether they are called civic pride, fan loyalty, or community spirit, they are nonrivalrous and nonexcludable, and they exist as a direct result of a team's presence. People talk about the team, share their hopes for its success, and exult in its victories, drawing a city together into a community with a shared sense of purpose. This cultural significance of sports probably exceeds its economic significance as a business (Noll and Zimbalist, 1997, p. 56). Fort (1997) agrees with Noll and Zimbalist, who point out that the magnitude of these external benefits is "difficult to quantify, but the possibility exists that they exceed the subsidies to stadiums" (p. 58).

The public good of civic pride may be the reason so many state and local governments choose to subsidize stadiums despite the overwhelming evidence that the total costs exceed direct and indirect benefits. No study to date has measured the value of benefits

generated by the public goods produced by big-time sports.

This article applies the contingent valuation method (CVM), widely used to measure the value of environmental public goods, to two publicly funded sports projects in Fayette County, Kentucky, which includes Lexington. The CVM elicits preferences for public goods by surveying what people would be willing to pay for them. It presents consumers with hypothetical opportunities to buy public goods, thus circumventing the absence of real markets for them. This approach has come to be called the contingent valuation method because the willingness to pay (WTP) information thus elicited is contingent on the hypothetical market that is described in the survey (Mitchell and Carson, 1989, pp. 2–3).

This article determines the extent to which people consume the public goods generated by sports, whether the public goods are valued by those who do not attend games, and most important, the value of public goods generated by sports teams. The article first describes the Lexington proposals. It next describes the survey instrument, the empirical model, and results. It then discusses the policy implications of this study. Conclusions and suggestions for future research follow.

II. FAYETTE COUNTY PROPOSALS

The first proposal called for a new basketball arena for the University of Kentucky (UK) Wildcats, who have played since 1976 in county-owned Rupp Arena. The second would build a baseball stadium to attract a minor league baseball team.

The basketball arena arose as an issue a few months after UK won its sixth National Collegiate Athletic Association (NCAA) championship in 1996. Then-coach Rick Pitino, with apparent support from the university administration and backing from several private donors, proposed building a new \$100 million, university-owned arena to generate greater income for the university, to provide more modern facilities, and to allow the team greater access to its home court for practice. Although Pitino advocated the use of private money, a new arena would impose costs on Fayette taxpayers. They currently subsidize Rupp Arena operating costs and will be paying off the debt from its construc-

tion until 2016. The loss of Rupp's major tenant would increase the annual subsidy, a subject of much concern in the public discussion that ensued from Pitino's proposal.

Although the Wildcats are not a major league team, they serve the same purpose in Kentucky. Many observers have noted the remarkable hold the Wildcats have on their fans, and UK basketball is regularly likened to a religion (see, e.g., Feinstein, 1997; Reed, 1998; Wheeler, 1998). If any team engenders fan loyalty and civic pride, it is the Kentucky Wildcats.

In 1996 and 1997, Fayette County faced requests for public funding of a minor league baseball stadium to cost about \$10–12 million. With a metropolitan population of more than 400,000, Lexington is one of the largest metro areas in the United States without a professional baseball team. A local developer in 1996 proposed to bring a team from the AA Southern League to town, and the league indicated it would move a team to Lexington as soon as a stadium was ready. The mayor, who is chief executive of the merged government of Lexington and Fayette County, initially supported the idea, then withdrew her support, and the project seemed to die. It was revived briefly in 1997 when it appeared that state money, rather than local money, might finance the stadium.

The two Lexington projects provide an opportunity to examine several aspects of the public-good nature of professional sports. The basketball arena could result in an improvement of the quality of an existing public good, while the baseball stadium would result in the difference between having a public good and not having one.

III. SURVEY

In April 1997, about one week after UK lost the NCAA championship game, we sent a CVM survey to a sample, purchased from a professional sampling firm, of 500 randomly selected households in Lexington. Fifty of the surveys proved undeliverable. Of the 450 delivered, 230 were returned, a response rate of 51.1%. Definitions and descriptive statistics of the variables taken from the survey and used in the regressions later in this article appear in Table 1. This section describes additional details.

The sample's demographic characteristics resemble those of Fayette County's entire population, though the sample comprised somewhat more Whites and was better educated and more affluent. Ninety-one percent of survey respondents were White, compared to 83.2% in Fayette County as a whole. The respondents averaged 14.9 years of schooling, whereas about one third of the Fayette population aged 18 and older have at least an associate's degree and many more in the 18–24 age group are still in school. The average respondent was 48 years old, probably close to the median age of the adult population in Fayette County, since 47% of the population is 18–44 and 11.8% is 45–54.

The CVM captures both use and nonuse values (Mitchell and Carson, 1989). Use value is the portion of WTP motivated by the revealed behavior of attending games. Non-use value is the portion of WTP that is motivated by behavior such as talking about sports with friends and family. Our survey presented two contingent valuation scenarios designed to elicit WTP for a government policy to build (1) an improved basketball arena and (2) a minor league baseball stadium. (The survey instrument and details about the coding of the variables are available from the authors via the World Wide Web at <http://personal.ecu.edu/whiteheadj/data>.)

The survey asked respondents about their consumption of UK basketball during the recently completed 1996–97 season. The first question asked about their private good consumption—how many games they attended in Rupp Arena. Several others asked about their consumption of nonexcludable public good aspects—fan loyalty—of UK basketball. The survey results provide evidence of a substantial public goods component to UK basketball. Of 229 respondents reporting the number of games they attended in the 1996–97 season at Rupp Arena, 138, or about 60%, said they attended no games. Another 62, about 27%, said they attended only one to three games. Yet, although most people never attended a game, 56% of the respondents reported watching at least 11 games on television. Only 7.4% claimed to have watched no games.

Seventy-two percent of all respondents reported they regularly, either a few days per

TABLE 1
Variable Definitions and Summary Statistics

Variable	Definition	<i>n</i>	Mean	Std Dev	Min	Max
WTPUK	Amount in dollars respondent <i>i</i> is willing to pay per year for a new UK arena	223	5.26	14.85	0	85
WTPBB	Amount in dollars respondent is willing to pay per year for baseball stadium	229	3.92	10.17	0	85
UKGAMES1	UK games attended by respondent in Rupp Arena in 1996–1997 season	229	1.63	3.09	0	13
USE UK	1 if respondent attended a UK game in 1996–1997 season	229	0.40	0.49	0	1
USE BB	1 if respondent said he or she would attend a baseball game if a stadium were built	217	0.58	0.49	0	1
PUBGOOD	Sum of four dummy variables measuring consumption of public goods generated by UK basketball	230	2.25	1.37	0	4
MOREGAME	1 if respondent says he or she would attend more games in new arena than in old	230	0.23	0.42	0	1
TAXARENA	\$1, \$5, \$10, or \$25, depending on the amount requested from respondent on the discrete choice WTP new arena question	229	9.53	9.08	1	25
BBGAMES	Baseball games respondent says he or she would attend if a stadium were built	217	3.88	7.61	0	70
TAXSTAD	\$1, \$5, \$10, or \$25, depending on the amount requested from respondent on the discrete choice WTP stadium question	230	9.53	9.06	1	25
HOUSE	Number of people normally living in the same household as respondent	228	2.52	1.18	1	6
SEX	1 if respondent is male, 0 otherwise	228	0.55	0.50	0	1
RACE	1 if respondent is male, 0 otherwise	229	0.91	0.29	0	1
AGE	Age in years of respondent	224	48.06	15.43	23	87
TENURE	Years respondent has lived in Lexington (interval data, with maximum value of 25 assigned to those responding “more than 20”)	230	20.58	7.20	1	25
EDUC	Years of formal education completed by person <i>i</i> (interval data, with maximum value of 18 assigned to those who completed graduate or professional school)	229	14.90	2.40	8	18
INCOME	1996 self-reported income of respondent	215	49.01	24.53	7.5	82.50

week or daily, read about UK basketball. Seventy-two percent also said they regularly discuss UK basketball with others. About one third of the respondents claimed they “live and die” with the Wildcats while 55.5% professed to be casual fans. Just under half, 49.1%, of respondents believed the quality of life in Central Kentucky would fall slightly (28.6%) or a great deal (20.5%) without UK basketball.

Clearly, UK basketball plays a prominent role in the lives of Lexingtonians, even though most never attend a game. The production of UK basketball games generates substantial nonrivalrous and nonexcludable

public goods. Would people be willing to pay for them?

This CVM survey posed a hypothetical situation closely based on the facts of Pitino’s arena proposal. The survey said a new arena could have 4,000 more seats and 30 more luxury suites than Rupp and that it could be the largest arena in the country built for college basketball. It suggested that such an arena would enhance UK’s recruiting of players and its ability to reach the NCAA Final Four and to win national championships. It said that although UK had not asked for public money, the local government might have to provide larger annual

subsidies to Rupp Arena if the Wildcats moved out.

Fewer than 26% of respondents said they believed a new arena would enhance the prestige of UK and help it win a national championship. A newer, bigger arena would attract more of the respondents to UK games, but nearly half of them—105 of 224—said they would attend no games in a new arena.

A key portion of any CVM survey asked respondents if they are willing to pay for an enhancement in the quality or quantity of a public good. This survey's initial WTP question is discrete choice: "Would you be willing to pay \$*X* per year out of your own household budget in higher taxes to help pay for a new arena?" Respondents were presented with one of four different values for *X*: \$1, \$5, \$10, or \$25. Then, the WTP values were elicited with a payment card format: "What is the most you would be willing to pay out of your own household budget per year to make a new arena possible?" The potential responses were zero, between \$0.01 and \$4.99, between \$5 and \$14.99, between \$15 and \$29.99, between \$30 and \$49.99, between \$50 and \$75, and more than \$75. Coding the interval data at the midpoints of the intervals generates the dependent variable WTPUK for the University of Kentucky arena (Table 1).

Perhaps because so few believed a new arena would help UK, more than two thirds of the respondents said they would be unwilling to pay higher taxes for a new arena, even though a large majority consume the public goods generated by the basketball team. Of the 72 respondents willing to pay higher taxes, 26 said the reason was that they like to attend UK games. Thirty-eight gave public good reasons—they liked to discuss basketball with others, they thought it would improve the quality of life in the area, or they said it would make them proud to have such an arena in Lexington.

Of the 169 who offered reasons for their opposition to higher taxes, only 2.4% said it was because they cared nothing for UK basketball. The most popular answer, selected by 36.7%, was that "taxes should not be used for a basketball arena." Others thought Rupp Arena is fine as it is or should be renovated. A little more than 11% thought UK made enough money from basketball to pay its

own way, while a similar portion thought they paid too much in taxes already.

The survey also presented respondents with a hypothetical situation based on the proposal to build a minor league baseball stadium with public money. The survey said the stadium would seat 6,500, would resemble an old-fashioned baseball park, and would host 60–70 games per summer.

Because Lexington has had no minor league baseball team for decades, the survey asked no questions about past consumption of baseball. Respondents were asked how many games they thought they would attend each year. Then they were asked the same two WTP questions as in the basketball section. The WTPBB variable was coded in exactly the same fashion as the WTPUK variable described above. As with the arena, most respondents, 63.3%, said they would oppose higher taxes for a baseball stadium. Of those willing to pay, 46.3% said they wanted to attend games, a private good motivation. Few cited public good motivations. No one said they would pay taxes because they wanted to discuss Lexington baseball, and only one person said having a minor league team would make him proud. Nine people supported higher taxes because they thought Lexington would be a better place to live if it had a baseball team.

Thirty people, or 36.6% of those willing to pay higher taxes, thought it would create jobs and boost the Lexington economy. This, despite the many news articles and opinion pieces in the Lexington newspaper debunking the stimulus of sports teams, lends credence to the view that a substantial portion of stadium backers are simply misled and mistaken about the economic benefits of sports. People may suffer from "stadium illusion" and believe that the activity associated with a stadium represents a net increase in income.

The survey concluded by asking demographic and economic questions about the respondents and their households—how many people they normally lived with, their sex, their race, their birth year, how long they had lived in Kentucky, how much education they had completed, and their household's 1996 income before taxes. They were given a space on the back cover of the survey booklet to comment on any other con-

cern they might have about the future of Lexington.

IV. EMPIRICAL MODEL

Using standard CVM methodology, the survey results can be used to determine whether people are willing to pay for a new arena or a new stadium. Furthermore, WTP can be decomposed into use value and nonuse value components. In the present cases, the use value represents the WTP for game attendance at a new arena or baseball stadium. The nonuse value measures the WTP for the consumption of the public goods, such as fan loyalty, that might result from an arena or stadium.

In order to derive such results for the two cases under consideration, WTP models for the UK and baseball models are specified in the following way:

(1) WTPUK

$$= f(\text{INCOME}, \text{USER}, \text{GAMES}, \text{MOREGAME}, \text{PUBGOOD}, \mathbf{D}),$$

(2) WTPBB = $f(\text{INCOME}, \text{USER},$

$$\text{BBGAMES}, \mathbf{D}),$$

where INCOME measures the ability to pay the increased taxes. The dummy variable USER indicates whether a respondent attends any UK games in (1) or expects to attend any baseball games in (2). The number of UK basketball games attended during the past year is GAMES and allows a distinction between those who are frequent attendees and those who are not. The number of additional games respondents expect to attend in a new arena is MOREGAME and PUBGOOD is a variable that represents the public good aspects of UK basketball. The number of baseball games respondents said they would attend is BBGAMES, and $\mathbf{D}$ is a vector of standard demographic variables. Complete definitions and summary statistics of all variables used are given in Table 1.

WTP should increase with income, if the goods associated with the arena and stadium are normal. The expected effects of the other demographic variables on WTP are ambiguous. WTP should vary across individuals according to whether they attend games, how many games they attend, and whether they

expect to attend more games in a new arena. Each of these variables allows measurement of the use value of the quality change. The nonuse value is the residual difference between WTP and use value and is measured by setting USER, GAMES, and MOREGAME equal to zero.

The public good characteristics of UK basketball were measured with a series of behavioral and attitudinal questions. Dummy variables measuring the importance of activities related to UK basketball other than game attendance were summed to form a scale variable. The activities included the importance to the respondents of reading and discussing UK basketball, the respondents' overall interest in UK basketball, and the contribution of UK basketball to the overall quality of life.

The first variable in the public good scale variable (READ) measured the amount of reading done about UK basketball: "During the season, how often do you read about UK basketball in newspapers or in magazines?" The answers were "never," "rarely," "a few days per week," and "daily." The variable READ is equal to zero if the respondent answered never or rarely and one otherwise. Seventy-four percent of the sample read about UK basketball at least a few days a week.

The second variable considers the amount of conversation about UK basketball: "During the season, how often do you discuss UK basketball with friends, family, and fellow workers?" The potential answers were the same as for READ. The variable DISCUSS is equal to zero if the respondent answered never or rarely and one otherwise. Seventy-four percent of the sample discussed UK basketball at least a few days a week.

The third variable measured the respondents' overall level of interest: "What best describes your level of interest in UK basketball?" The answers were "I live and die with the Wildcats. I'm happy if they win and sad if they lose," "I'm a casual fan. I like the Wildcats, but I don't lose sleep over them," "I don't pay any attention to UK basketball," and "I am tired of hearing about UK basketball." The variable INTEREST is equal to one if the respondent lives and dies with the Wildcats and zero otherwise. One third of the sample claimed they live and die with the Wildcats.

The fourth variable measures attitudes toward the quality of life with UK basketball: "Without UK basketball, do you believe the quality of life in Central Kentucky would...?" The potential answers were "improve a great deal," "improve slightly," "remain unchanged," "fall slightly," or "fall a great deal." The variable *QUALLIFE* is equal to one if the respondent answered fall slightly or fall a great deal and zero otherwise. Forty-eight percent of the sample state that the quality of life in central Kentucky would fall without UK basketball.

The variable *PUBGOOD* is equal to the sum of the *READ*, *DISCUSS*, *INTEREST*, and *QUALLIFE* and is increasing in the motives for nonuse values of an improved UK basketball arena. *PUBGOOD* is almost uniformly distributed over the 0, 4 interval. Considering the relatively small sample size, the scale is reliable according to Cronbach's alpha ($\alpha = .69$). We also estimated models using the variable representing the contribution of UK basketball to the overall quality of life instead of *PUBGOOD*. Results are similar, so we proceed with the *PUBGOOD* variable. These results are available on request.

V. EMPIRICAL RESULTS

The analysis uses complete case analysis dropping any observation with item nonresponse on any variable in Table 1. The sample size for both the basketball and baseball models is 190. The WTP dependent variables can be analyzed in several ways, including ordinary least squares. However, ordinary least squares will be inferior to other methods, since the data (1) are censored at zero (there are no negative WTP values) and (2) the WTP values are intervals, not continuous data (Greene, 1997). Estimating the models with the interval data technique would ignore the censoring of the dependent variable at zero. Estimating the models with Tobit would require that the midpoints of the WTP intervals be used. While there are costs and benefits associated with both methods, the Tobit model is chosen. For many policy issues, WTP questions generate many zero WTP responses. These data are no different, with 68% and 63% of the sample expressing

zero WTP for the UK and baseball contingent markets. Ignoring this large percentage of zero values would result in significant bias. Therefore, Tobit is used to estimate the theoretical models of Equations (1) and (2).

For both Equations (1) and (2), the simultaneous equations Tobit model (Greene, 1998, p. 685) was used to test for exogeneity since WTP and the number of games to attend are joint decisions. Several models were used to explain each of the potentially endogenous variables, *GAMES*, *MOREGAME*, and *BBGAMES*. In each case, the null hypothesis of exogeneity could not be rejected. Therefore, the analysis proceeds under the assumption of exogeneity.

The Tobit results reported here are broadly consistent with results using the other estimation techniques. For instance, interval maximum likelihood estimation and ordered logit yield virtually the same results in terms of the statistical significance of coefficients. Each technique is superior to Tobit in some respects and inferior in others. But because Tobit recognizes that most respondents reported zero WTP, while the other techniques do not, Tobit is preferable to the others for this application. In addition to the payment card question, we also analyzed the discrete choice questions about taxes. The WTP from a probit model yielded negative WTP estimates. Therefore, a Weibull survival model that constrains the WTP to be positive was run using the discrete choice answers (see Haab and McConnell, 1997). The estimated median WTP was about \$9 for both the stadium and the arena cases. The survival model coefficients are difficult to interpret, and it is impossible to decompose WTP into use and nonuse values.

In the basketball arena model, none of the demographic variables is a statistically significant predictor of WTP. We dropped these variables and conducted a likelihood ratio test for the joint effects of these variables. The likelihood ratio test indicates that the demographic variables are jointly insignificant ($\chi^2 = 4.82$, 6 df). Therefore, the discussion focuses on the more parsimonious reduced model in Table 2. None of the conclusions drawn from this model differs from those of the full model described by Equations

TABLE 2
Determinants of Willingness to Pay for UK Arena

Variable	Coefficient	S.E.	B / S.E.	Mean	Marginal Effects
Constant	-43.36	8.79	-4.94		-12.40
UKGAMES1	2.08	0.83	2.52	1.62	0.60
MOREGAME	1.78	0.87	2.06	1.22	0.51
USE UK	11.70	6.28	1.86	0.55	3.34
INCOME	0.11	0.10	1.09	49.97	0.03
PUBGOOD	5.20	2.15	2.42	2.29	1.49
Standard error	24.71				
Log likelihood	-363.05				

Note: S.E. = standard error; B/S.E. = coefficient divided by S.E.

tion (1). The results for the full model, including demographic variables, are available on request.

Income does not affect WTP. People who attended any UK games in the most recent season before the survey were willing to pay \$3.34 per year for a new arena. Their WTP increased by \$0.60 for each game they attended in the previous year, plus \$0.51 for each additional game per year they expected to attend in a new arena. All three results are statistically significant, and the results for USER and GAMES show clearly that respondents who attended UK games differed from those who did not.

Nonuse value motives, as measured by PUBGOOD, are also positive and statistically significant predictors of WTP. Each additional nonuse value motive that is included in the PUBGOOD scale leads to an increase in WTP of \$1.49.

Results for the Tobit regression models of determinants of WTP for the baseball sta-

dium broadly parallel the results for the basketball arena. The demographic variables are insignificant predictors of WTP. The likelihood ratio test indicates that the demographic variables are jointly insignificant ($\chi^2 = 6.09$, 6 df). The results for the model without demographic variables are shown in Table 3. The ability to pay variable (INCOME) is positively but insignificantly related to WTP. Respondents who expected to use the baseball stadium were willing to pay \$5.93 per year, plus an additional \$0.17 for each game they expected to attend.

Mean WTP, use value and nonuse value, and 95% confidence intervals were estimated by evaluating the coefficients from the Tobit models at the mean of the independent variables. Table 4 presents the results for both basketball and baseball. Nonuse value estimates were found by setting the user status and the number of games attended in each model equal to zero. Use value was then estimated as the difference between the

TABLE 3
Determinants of Willingness to Pay for Baseball Stadium

Variable	Coefficient	S.E.	B / S.E.	Mean	Marginal Effects
Constant	-29.46	5.43	-5.43		-8.30
USE BB	21.03	4.70	4.47	0.61	5.93
INCOME	0.08	0.07	1.14	49.97	0.02
BBGAMES	0.60	0.18	3.27	4.04	0.17
Standard error	17.88				
Log likelihood	-351.27				

Note: S.E. = standard error; B/S.E. = coefficient divided by S.E.

TABLE 4
Willingness to Pay Estimates

	Mean	S.E.	B / S.E.	95% Confidence Interval	
				Lower Bound	Upper Bound
UK Arena					
WTP	\$6.36	1.40	4.56	\$3.62	\$9.10
NUV	\$1.92	0.76	2.53	\$0.43	\$3.41
UV	\$4.44	1.45	3.07	\$1.60	\$7.28
BB Stadium					
WTP	\$6.17	0.94	6.56	\$4.33	\$8.01
NUV	\$0.62	0.34	1.80	-\$0.05	\$1.29
UV	\$5.55	0.94	5.90	\$3.71	\$7.39

Note: S.E. = standard error; B/S.E. = coefficient divided by S.E.

mean WTP and nonuse value calculated when user status and games attended equal zero. WTP for the UK arena quality improvement is \$6.36, which decomposes into a nonuse value of \$1.92 and a use value of \$4.44. WTP for the baseball stadium construction is \$6.17, which decomposes into a nonuse value of \$0.62 and a use value of \$5.55. For both projects, nonuse value is a significant portion of WTP but is substantially smaller than use value. The use and nonuse values are statistically different for both projects at the 5% level.

VI. POLICY IMPLICATIONS

Previous studies have shown that publicly funded sports buildings fail to generate enough income to justify their construction. But these studies failed to account for the public goods associated with fan loyalty. Can the WTP estimates derived here help explain the widespread support for public subsidy of sports facilities?

To determine whether WTP can explain public funding of sports buildings, the annual WTP must be aggregated for the entire population. If aggregate WTP is interpreted as the annual flow of benefits generated by the facility, the present discounted value of the stream of future benefits can be interpreted as the capital value of the benefits. If the capital value of the benefits received in a city exceeds the total costs borne in that city, then construction of the stadium may appear desirable to local politicians and their constituents. However, even if total benefits exceed total costs, private investors may not want to build the stadium.

Private investors will want to build the stadium only if the capitalized use value exceeds the total costs, because private investors can only charge for use values—they cannot appropriate any of the nonuse values generated by a stadium. If use values are less than the total costs, private investors would lose even if total benefits exceed total costs. The stadium will not be built without a subsidy.

To get the annual aggregate stream of benefits for all of Fayette County, we multiplied the mean WTP estimates by number of households in 1995. The aggregate annual WTP, for the basketball arena, along with use values and nonuse values, are shown in Table 5. The upper bound figures were calculated by multiplying the number of households by the estimated WTP. The lower bound figure is 51% of the upper bound: 51% of the surveys were returned; the 49% of the sample who failed to return the surveys are assumed to have no interest in UK basketball, and following the practice recommended by Mitchell and Carson (1989, p. 282), they are assumed to have zero WTP in order to avoid sample selection bias.

The upper bound aggregate WTP estimates for the basketball arena is \$610,000 per year. The lower bound aggregate WTP is about \$311,000. Suppose the new arena is expected to have a 40-year useful life and assume a discount rate of 8% (the period and discount rate are meant to be illustrative only). Under these assumptions, the annual WTP estimates in Table 5 imply a capital value of total use and nonuse benefits from a new arena of anywhere from \$3.71 million to \$7.28 million. Of these amounts, nonuse

TABLE 5
WTP, Use, and Nonuse Value Estimates for New Arena

	Mean Estimate	Upper Bound	Lower Bound	Upper pv Estimate	Lower pv Estimate
Arena WTP	\$6.36	\$610,293	\$311,249	\$7,277,498	\$3,711,524
Arena NUV	1.92	184,239	93,962	2,196,981	1,120,460
Arena UV	4.44	426,054	\$217,287	5,080,518	2,591,064

Notes: Upper and lower bound estimates are based on 1995 estimate of 95,958 households. Present value (pv) estimates assume 8%, 40 years. NUV = nonuse value; UV = use value.

value, that is, the value of the public goods deriving from an enhanced UK basketball program, accounts only for \$1.12–2.20 million.

The new arena is projected to cost \$100 million or more. Clearly, if Fayette County taxpayers were asked to pay for a new arena on their own, the costs would exceed the benefits. This should come as no great surprise. Most respondents believed the new arena would do nothing to enhance the prestige or competitiveness of the UK basketball program. The team would not leave town or cease to exist if it failed to get a new arena. The public goods produced by the team would continue to be produced. A much different result might have occurred if the Wildcats' staying in town had depended on their getting a new arena.

Upper and lower bound aggregate WTPs for the baseball stadium can be calculated in the same way. The results are shown in Table 6. The upper bound aggregate annual WTP estimate for the baseball stadium is about \$592,000, while the lower bound estimate is about \$302,000 per year. A stadium with a 40-year life and financed at 8% could be justified if it cost no more than \$7.06 million

using the upper bound WTP and \$3.6 million using the lower bound WTP for total households.

In the public discussions of the proposed baseball stadium, total cost figures in the range of \$10–12 million were commonly mentioned. It is unlikely, even given the most generous estimates of aggregate WTP, that the total benefits of a baseball stadium could equal or exceed the total costs. It is unlikely that a baseball stadium would pay for itself from the revenues generated by its use, and so it is unlikely that such a stadium would be built without a subsidy. Furthermore, given the small portion of WTP attributable to nonuse value, any sort of subsidy would likely be unpopular among the population choosing not to attend games.

Of course, many UK fans live far beyond the borders of Fayette County. The total WTP measured for, say, the entire state of Kentucky, may far exceed the Fayette County estimates. Unless Fayette County could tax nonresidents, however, it is unlikely that Fayette taxpayers would consider the benefits of nonresidents. This may explain, however, why state governments sometimes subsidize stadiums.

TABLE 6
WTP, Use, and Nonuse Value Estimates for Stadium

	Mean Estimate	Upper Bound	Lower Bound	Upper pv Estimate	Lower pv Estimate
Stadium WTP	\$6.17	\$592,061	\$301,951	\$7,060,089	\$3,600,645
Stadium NUV	0.62	59,494	30,342	709,442	361,815
Stadium UV	5.55	532,567	271,609	6,350,647	3,238,830

Notes: Upper and lower bound estimates are based on 1995 estimate of 95,958 households. Present value (pv) estimates assume 8%, 40 years. NUV = nonuse value; UV = use value.

The UK arena results shed light on the case of the New York Yankees, and any other cases that might share key elements. Like the Wildcats, the Yankees are one of the top teams in their league, and they want a new stadium. Like the Wildcats, the Yankees are unlikely to move out of their home market, though like the National Football League Giants and Jets, they might move to New York's suburbs. Leaving the New York metropolitan area would deprive them of their huge local media market, an asset of such enormous value that a new stadium in a smaller, less affluent market could never compensate for its loss. If New Yorkers believe a new stadium would neither keep the Yankees from leaving the New York metro area nor turn them into contenders, it is not likely that nonuse values could justify much of the \$1 billion or more necessary to build a new stadium in Manhattan.

The Lexington baseball results are instructive, too. Minor league sports probably produce few of the public goods produced by major league sports. In Lexington, this resulted in nonusers not wanting to pay anything for a new stadium. If the Lexington case is typical, few minor league stadiums merit public subsidy. Of course, the Lexington cases are merely suggestive, and a definitive answer to whether public goods justify public subsidy in any particular case can only be answered with a study of that case.

VII. CONCLUSIONS

This article has presented initial results of an application of the contingent valuation method to sports arenas and stadiums. In both cases examined here, nonuse value represented a small portion of total willingness to pay for new sports facilities. The results do not support the frequently made claims that the public good values of new stadiums exceed the use values.

Neither of the cases examined here involved an established team that posed a

credible threat of moving to another city. Future research should explore the willingness to pay, use, and nonuse values of sports teams in cities that have a greater probability of losing an existing team. Future CVM studies should also examine the magnitude of "stadium illusion" misperceptions to allow for reliable estimates of the fan loyalty component of nonuse value.

REFERENCES

- Baade, Robert A., and Richard F. Dye, "The Impact of Stadiums and Professional Sports on Metropolitan Area Development," *Growth and Change*, Spring 1990, 1-13.
- Feinstein, John, "Pitino's Head Was Uneasy before He Wore the Crown," in "1997 Final Four," supplement to *Wall Street Journal*, March 28, 1997, 6+.
- Fort, Rodney, "The Stadium Mess," in *Stee-rike Four! What's Wrong with the Business of Baseball?* Praeger Publishers, Westport, Conn., 1997, 165-173.
- Greene, William H., Limdep, Version 7.0: User's Manual, Econometric Software, Inc., Bellport, NY, 1998.
- Haab, Timothy C., and Kenneth E. McConnell, "Referendum Models and Negative Willingness to Pay: Alternative Solutions," *Journal of Environmental Economics and Management*, 32:2, 1997, 251-270.
- Mitchell, R. C., and R. T. Carson, *Using Surveys to Value Public Goods: The Contingent Valuation Method*, Resources for the Future, Washington, D.C., 1989.
- Noll, Roger G., and Andrew Zimbalist, eds., *Sports, Jobs, and Taxes: The Economic Impact of Sports Teams and Stadiums*, Brookings Institution, Washington, D.C., 1997.
- Quirk, James, and Rodney D. Fort, *Pay Dirt: The Business of Professional Team Sports*, Princeton University Press, Princeton, N.J., 1992.
- Reed, Billy, "Bruins' Tradition Puny Next to Wildcats," *Lexington Herald-Leader*, March 17, 1998, D1.
- Rosentraub, Mark S., *Major League Losers: The Real Cost of Sports and Who's Paying for It*, Basic Books, New York, 1997.
- Shropshire, Kenneth L., *The Sports Franchise Game: Cities in Pursuit of Sports Franchises, Events, Stadiums, and Arenas*, University of Pennsylvania Press, Philadelphia, 1995.
- USA Today*, "Special Report: The Stadium Binge, Rich Owners Often Call the Tune in Stadium Dance," September 6, 1996, 20C.
- Wheeler, Lonnie, *Blue Yonder: Kentucky, the United State of Basketball*, Orange Frazer Press, Wilmington, Ohio, 1998.