BEYOND THE ECONOMIC CATALYST DEBATE: CAN PUBLIC CONSUMPTION BENEFITS JUSTIFY A MUNICIPAL STADIUM INVESTMENT?

CHARLES A. SANTO
The University of Memphis

ABSTRACT: *A host of empirical studies have indicated that stadiums and arenas have no significant impact on metropolitan area income or employment. In light of this evidence, the continued proliferation of public investment in sports facilities begs the question: Is there some other justification for this spending, or are policymakers simply acting against the public interest (either irrationally, or in response to political-economic influences)? A possibility that has not been fully explored is the notion that stadiums and teams generate tangible and intangible consumption benefits that could support some level of public investment. This research builds on a small foundation of literature that is moving discussion beyond the economic catalyst debate by providing an empirical measure of the consumption benefits that accrue to a region as the result of hosting a major league sports team. A contingent valuation survey is used to quantify the consumption benefits that would be associated with the relocation of a major league baseball team to Portland, Oregon. An empirical measure of the region's aggregate willingness to pay for the benefits associated with hosting a team is disaggregated into option and existence values, which can then be compared to any proposed level of public contribution to a new stadium. The findings indicate that consumption benefits would only support a capital investment of approximately $74 million; a figure far smaller than the typical stadium subsidy. The majority of projected benefits are associated with expected public goods and externalities, rather than anticipated attendance, indicating that an equitable financing plan should employ nonuser revenue sources. The level of projected benefits does not vary by locality within the metropolitan area, which argues for a regional cost-sharing approach. The willingness of residents to pay for stadium construction is tempered by a concern about other pressing social needs in the Portland area and a reaction to the current tax climate.*

In recent years, urban America has seen a remarkable boom in the construction of major league sports facilities—a trend that has come at a tremendous cost to metropolitan taxpayers. Since 1990, 70 major league sports facilities have been built at a public cost of nearly $11 billion. Of the fifty metropolitan areas that host a major league team, an astonishing 43 have spent public money on stadium or arena construction since 1990.

Stadium and arena developments are most often promoted as economic catalysts, and debates regarding public subsidies focus almost exclusively on the legitimacy of the stadium as an

Direct Correspondence to: Professor Charles A. Santo, City & Regional Planning, The University of Memphis, 208 McCord Hall, Memphis, TN 38152. E-mail: casanto@memphis.edu.

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economic development tool. A host of empirical studies, however, has established that conventional economic indicators cannot justify public investment in sports facilities. The evidence shows that stadiums and arenas have no significant impact on metropolitan area income or employment (Baade, 1996, 2000; Baade & Dye, 1990; Baade & Sanderson, 1997; Coates & Humphreys, 1999; Noll & Zimbalist, 1997; Rosentraub, 1997; Zimbalist, 1998; Zimmerman, 1997).

In light of this evidence, the continued proliferation of public investment in sports facilities, begs the question: Is there some other justification for this spending, or are policymakers simply acting against the public interest (either irrationally, or in response to political-economic influences)? A possibility that has not been fully explored in the current debate and literature is the notion that stadiums and teams generate tangible and intangible consumption benefits that could support some level of public investment.

In some cases, stadium proponents have begun to emphasize quality-of-life benefits over economic ones as empirical evidence regarding stadium economics has reached the mainstream media, but research devoted to measuring the external benefits associated with major league teams and facilities has been scarce. The intent of this study is to build on the foundation established by a small group of researchers (Carlino & Coulson, 2004; Irani, 1997; Johnson, Groothius, & Whitehead, 2001; Johnson & Whitehead, 2000) and help move discussion beyond the economic catalyst debate by considering the magnitude of consumption benefits generated by sports teams and facilities.

Empirical analysis of such benefits can help determine whether a particular subsidy would represent an enhancement of the public welfare or an inefficient government intervention. Contingent valuation (CV) methodology—a technique commonly used in valuing environmental public goods—can be used to provide an empirical measure of the potential consumption benefits associated with major league sports teams and facilities. Portland, Oregon provides an appropriate case study for the application of this methodology. Civic, business and political leaders in Portland have been involved in a campaign to attract a major league baseball team, which would require the construction of a new stadium. An application of contingent valuation methodology is used to quantify the potential consumption benefits associated with the relocation of a major league baseball team to Portland. An empirical measure of the metropolitan area's aggregate willingness to pay for the benefits associated with hosting a team is gathered through analysis of contingent valuation survey results. This value can be compared to any proposed level of public contribution to a new stadium. Additional survey questions are used to determine the elements that compose willingness-to-pay for professional baseball in Portland. This allows willingness-to-pay to be disaggregated into option and existence value. An empirical understanding of the distribution of benefits could help ensure equitable financing plans.

This paper begins with a description of the potential consumption benefits associated with professional sports facilities and a review of the few attempts that have been made to measure such benefits. A summary of the theory and application of contingent valuation methodology is followed by a description of the survey design for the Portland case study and an analysis of the findings. The paper concludes with a discussion of the implications of the research.

BEYOND THE ECONOMIC CATALYST DEBATE: THE IMPORTANCE OF CONSUMPTION BENEFITS

Sports facilities and teams create benefits associated with consumption that exist regardless of their ability to generate jobs or income (Noll & Zimbalist, 1997). *Private* consumption benefits accrue to fans that attend games and are directly related to the concept of consumer surplus. In this context, consumer surplus arises when the amount that a person is willing to pay for a ticket to a sporting event is greater than the actual cost of the ticket. The difference represents a benefit to the

consumer. *Public* consumption benefits encompass the intangible rewards associated with hosting a team, and are related to the economic concepts of positive externalities and public goods—two types of market failure. A variety of government interventions are justified on the grounds that the market does not efficiently provide public goods or properly account for externalities on its own.

Because residents can derive a variety of benefits from local sports teams without ever attending a game, teams can be said to generate positive externalities. For example, newspapers, television news programs, and talk radio shows devote a great deal of their attention to local sports teams. Sports fans derive utility from this coverage with no compensation to team owners. Water cooler conversations about the upcoming pennant race may create pleasure for local sports fans, but they cost nothing. Because of the presence of these externalities, the direct demand experienced by a team understates the total benefit of that team to local residents (Noll & Zimbalist, 1997). Sports teams also produce certain public goods—benefits that are jointly consumed and from which no one can be excluded. These might include things like civic pride, greater community cohesion, and the image benefits of "big league city" status. Such benefits accrue to fans as well as nonfans.

In a survey of 1,536 Indianapolis residents, Rosentraub & Swindell (1998) found significant evidence of "social spillover benefits" associated with local sports teams. Respondents ranked auto racing, the NFL Colts and the NBA Pacers as Indianapolis's top three contributors to civic pride and national reputation. These results demonstrate that sports teams can produce positive externalities or public goods that are valued by local residents.

It might seem a stretch to suggest that these kinds of benefits can justify the enormous public subsidies that cities offer for sports facilities; however, Noll and Zimbalist (1997) offer a hypothetical investment situation that provides an important perspective. They put forth a stadium receiving a subsidy of $250 million in a metropolitan area of five million residents. The annual cost of servicing the debt to finance such a stadium would be equivalent to approximately $5 per resident. "It does not vastly stretch credulity to suppose that, say, a quarter of the population of a metropolitan area derives $20 per person in consumption benefits annually from following a local sports team. If so, the consumption benefits of acquiring and keeping a team exceed the costs" (Noll & Zimbalist, 1997, p. 58).

MEASURING CONSUMPTION BENEFITS

A public investment equivalent in size to these consumption benefits could represent an appropriate response to market failure; however, any subsidy in excess of these benefits could be considered government failure. While many economists acknowledge the existence of consumption benefits associated with sports facilities, research devoted to their empirical measurement has been scarce. A handful of studies provide a foundation for further research.

Irani (1997) estimated the annual consumer surplus associated with major league baseball (MLB) teams by generating a demand curve for tickets and comparing demand to prices. The results indicate that baseball teams generate "nontrivial consumer surplus." However, because Irani's methodology was unable to account for price discrimination, his findings represent upper bound estimates of consumer surplus. This approach is also unable to account for any welfare loss associated with increased taxes related to the use of public subsidies. In addition, a measurement of consumer surplus only accounts for the extra benefits that accrue to persons who attend games. It does not account for public consumption benefits—the external benefits received by residents who derive utility from the existence of a team without ever purchasing a ticket.

Carlino and Coulson (2004) used hedonic rent and wage regressions to measure the compensating differentials that exist in National Football League (NFL) cities. All else being equal, regional amenities attract residents, which drives up housing costs and drives down wages. Economists

refer to these effects on wages and housing costs as compensating differentials. The compensating differential can be thought of as the implicit price that people are willing to pay to live in a locality that provides a certain amenity. Carlino and Coulson found, all else being equal, the presence of an NFL team increased annual rents by approximately 8%. Wages were found to be 4% lower in NFL cities; however, this effect was not statistically significant. It is not clear whether the fixed effects model employed by Carlino and Coulson was able to account for all other city-specific variables that could confound the relationship between NFL teams and rents. The combinations of attractive attributes that could exist in coincidence with the existence of an NFL franchise are limitless.

Contingent valuation (CV) methodology, which directly elicits individuals' willingness to pay, allows for the most direct comparison of per capita consumption benefits and per capita costs. Using CV would therefore allow a locality to determine the level of per capita investment justified by per capita consumption benefits. Johnson and Whitehead (2000) and Johnson, Groothius, and Whitehead (2001) demonstrate how CV methodology can be used to measure the consumption benefits generated by a sports facility and provide the groundwork for further research.

Johnson and Whitehead (2000) examined two proposed facilities in Fayette County, Kentucky: a new basketball arena for the University of Kentucky (UK) and a minor league baseball stadium. Respondents were asked, "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 mean annual willingness-to-pay for a new basketball facility was $6.36, which Johnson and Whitehead estimate would support capital costs in the range of $3.71 to $7.28 million. For the baseball stadium, the mean annual willingness-to-pay was $6.17, which would support capital costs between $3.60 and $7.06 million.

This analysis indicates that the proposed facilities would not generate enough consumption benefits to justify any significant public investment. These results are a reflection of the preferences and attitudes of local residents regarding the proposed investment. Johnson and Whitehead suggest that Fayette County residents, even those who described themselves as fans, had little incentive to support an investment in a new UK arena. This is partly because the UK basketball team is place-bound by nature, and would remain in Fayette County regardless of whether a new arena was constructed. "The public goods produced by the team would continue to be produced" (57). The same cannot be said of professional sports franchises. A locality facing threats of relocation or the possibility of acquiring a new team would have to consider very different factors in constructing their willingness to pay. The consumption benefits associated with a major league baseball team are likely to be greater than those associated with a minor league team, as measured in this case. In this sense, the nature of the specific cases examined by Johnson and Whitehead limits the applicability of their findings to more typical stadium investment decisions. This does not, however, limit the applicability of the technique.

Johnson, Groothius, and Whitehead (2001) used a CV approach to examine the value of the National Hockey League Penguins to Pittsburgh area residents. After the Penguins declared bankruptcy in 1998 there was a concern that they would be relocated to another city. The CV survey presented a hypothetical scenario in which the city of Pittsburgh would purchase the team in order to keep them in town permanently. Respondents were asked how much they would be willing to pay in taxes to support such a scenario. The mean annual willingness-to-pay was $5.57, which the authors estimate would support capital costs in the range of $23.49 to $65.97 million.

Johnson, Groothius, and Whitehead (2001) note that "hockey is the least popular of four major league team sports in the United States. It is possible that the value of the public goods generated by hockey teams falls short of the value generated by other sports teams" (20). Their analysis is also unique in that respondents' hypothetical payments were tied to municipal purchase of a team, rather than construction of a new facility to lure or keep a team. Prior to the administration of the survey, the Penguins organization was purchased by a group of local investors, which alleviated any

immediate threat of locations. This development is likely to have affected respondents' willingness to pay.

With their contrasting results, these studies do not clearly reveal whether consumption benefits can justify large public investments in professional sports facilities; however, they do illustrate the potential importance of such benefits. More importantly, they demonstrate that these benefits can, in fact, be quantified with creative applications of econometric techniques and statistical analysis.

In the absence of economic development benefits, a stadium investment can only be considered a welfare improvement if consumption benefits exceed the level of subsidy. Additional empirical research can further establish the legitimacy and potential magnitude of consumption benefits, and continue to move evaluation and discussion beyond the economic catalyst debate. The current climate of major league baseball provides an appropriate opportunity for such research.

THE PORTLAND CASE STUDY

Following the 2002 season, MLB Commissioner Bug Selig announced the league's intention to relocate the Montreal Expos franchise. This would be the first MLB relocation since the second incarnation of the Washington Senators moved to Texas in 1972. In response, volunteer groups and public officials in several cities mobilized campaigns to win the relocation derby. While the Expos were eventually relocated to Washington, D.C., Portland was considered a serious contender and solid candidate to host a team. The owners of other teams seeking a new stadium, such as the Florida Marlines, Minnesota Twins, and Oakland A's, have openly discussed the possibility of relocation and would likely consider Portland a viable option. An analysis designed to measure the public consumption benefits associated with hosting an MLB team would help public officials in Portland determine whether a stadium investment would be justified.

Portland is currently the largest market in the United States with only one major league sports team (the NBA Trail Blazers). The Oregon Sports Authority, the Oregon Baseball Campaign, the Portland Baseball Group, and state and local representatives have been actively campaigning to bring MLB to Portland for some time. Portland does not currently have a facility adequate to provide a long-term home for an MLB team, and the development of a stadium financing and construction plan is an essential component of the MLB campaign. The Oregon State Legislature recently authorized a plan that would divert income tax revenue generated by players' salaries to repay bonds issued for stadium construction. This would not impose a direct tax burden on Oregon residents; however, this funding is only projected to cover $115 million of the stadium construction costs, meaning significant additional local spending would be required. With an estimated total cost of $350 million, stadium construction could require a local subsidy of approximately $235 million, depending on owner contribution and the accuracy of income tax revenue projections and cost estimates (The Finance Plan, 2004). This figure is typical of stadium subsidies of recent years.

It is possible that hosting an MLB team would generate significant public consumption benefits for Portland area residents. Portlanders have shown considerable interest in MLB, posting the seventh highest Nielsen television ratings in the nation for the 2002 World Series (Series Interest, 2002). A Seattle Mariners 2002 exhibition game held at Portland's minor league facility sold out in less than fifteen minutes. Landing an MLB team could bring image benefits that some might find important. The perceived competition for regional recognition between Portland and Seattle might influence the preferences of Portland residents regarding the value of an MLB team. On the other hand, it is possible that these factors are relatively trivial to many Portland residents. Portlanders might be more concerned with other social needs that could be considered more pressing, such as stabilizing the public education system.

CV methodology provides the only applicable technique for measuring consumption benefits in the case of a city trying to attract a new team. The data necessary to estimate a city's sports-related consumer surplus or compensating differential effects (e.g., ticket prices, housing costs, wages, etc.) would simply not be available. An application of CV methodology to a scenario that involves a major league baseball team whose associated public goods would be dependant on the construction of a stadium could be informative to many cities. Portland provides an appropriate opportunity for the application of CV analysis to a major league situation.

CONTINGENT VALUATION (CV) METHODOLOGY

Contingent Valuation is a nonmarket valuation method commonly used in assessing the value of environmental goods, which can be employed to determine the magnitude of consumption benefits associated with professional sports teams and facilities. CV elicits willingness-to-pay for the protection or provision of public goods through the use of surveys that present respondents with hypothetical opportunities to "buy" the good in question. Respondents express their willingness-to-pay (WTP) for a public good contingent upon a specified hypothetical payment vehicle and provision of the good. WTP measurements reflect total economic value, which includes both *use value* and *existence value*. In the context of sports stadiums, use value accrues to those who actually attend games. (In this study, the term *option value* is used to reflect *anticipated* use value, or anticipated private consumption benefits.) The existence value of a stadium comprises the public consumption benefits that the facility and related team provide to those who do not participate as actual buyers and sellers of tickets.

Although the design of CV surveys vary widely, they generally contain the following common elements (Mitchell & Carson, 1989; Portney, 1994):

1. A description of the good that the respondent is being asked to value with appropriate background context.
2. A question that elicits WTP, based on an appropriate payment vehicle (e.g., a tax increase or a utility bill increase).
3. Follow-up questions designed to determine the characteristics and attitudes of the respondents, with the intent of estimating a WTP function that includes these characteristics as possible explanatory variables.

Statistical analysis is used to determine a mean WTP across survey respondents, which can then be generalized to the greater population from which the sample was drawn to determine an aggregate WTP. Further analysis based on follow-up questions can be conducted to determine the components of WTP, isolating use and existence values.

While there are a variety of techniques for eliciting WTP, guidelines for best practice recommend the use of a dichotomous choice question with a coercive and plausible payment vehicle (Arrow et al., 1993; Bateman et al., 2002; Carson, Flores, Martin, & Wright, 1996; Carson, Groves, & Machina, 1999; Hanemann, 1984; Hanemann & Kanninen, 1999). Using this approach, each respondent in the survey is assigned a randomly selected price and asked whether they would be willing to pay that price for provision of the good in question. The survey question can be framed as a referendum by asking respondents how they would vote if faced with some program that would produce a certain good in exchange for some form of payment (Portney, 1994). The use of a tax increase as a coercive payment vehicle provides an incentive for respondents to reveal their preferences truthfully; respondents will be more likely to carefully consider their responses and less likely to overstate their WTP if they believe that their responses could lead to a tax increase.

The referendum approach provides a sense of reality by putting respondents in a hypothetical situation that they are used to facing. Not only are referenda common in practice, but the day-to-day purchasing behavior of consumers is based on decisions to accept or reject a certain price for a certain good. For this reason, the referendum approach closely approximates market-like transactions.

Alternate techniques for eliciting WTP suffer from several sources of bias. Early CV applications often used open-ended elicitation questions, such as, "how much would you be willing to pay to preserve 500 acres of old growth forest?" This approach poses a problem in that respondents might not be able to construct a meaningful or reasonable value for an unfamiliar good. Open-ended questions also invite unrealistically large or small protest bids. An alternate elicitation technique based on a bidding process faces the problem of starting point bias, in which the opening bid might seem to imply the cost at which the government is able to provide the good (Mitchell & Carson, 1989).

The referendum approach offers a significant advantage over other techniques for eliciting WTP; however, it also creates some analytical complexities. The dichotomous choice elicitation of WTP provides less information than an open-ended or continuous choice technique because respondents are only asked to accept or reject a certain price, rather than to provide their maximum WTP. Thus, if a respondent answers "yes" to a bid amount of $10, the analyst knows only that the respondent's true WTP lies in the interval ($10,∞). The analyst must make inferences about maximum WTP by comparing the probabilities of yes or no responses at alternative bid amounts (Loomis, 1988). Bateman et al. (2002), Loomis (1988), Hanemann (1984), Hanemann and Kanninen (1999), and Park, Loomis and Creel (1991) describe analytical procedures for dichotomous choice CV surveys. A logit regression with the yes/no response as the dependant variable, and bid price among the explanatory variables, allows the analyst to determine the relationship between the bid amount and the probability of a yes response.

Some researchers have attempted to improve the statistical efficiency of the dichotomous choice method by adding a follow-up choice to accept or reject a price that is either higher or lower than the initial price, depending on the initial response. This double-bounded dichotomous choice approach provides more information about respondents' WTP, but it is prone to several important drawbacks. Herriges and Shogren (1996) found evidence of starting point bias in the pairs of responses to the initial and follow-up payment questions. Critics of the double-bounded dichotomous choice approach argue that respondents might reject the reality of the elicitation scenario if the follow-up question leads them believe that the quality of the good has changed, or that the government is willing to bargain over the cost of the good (Alberini, Kanninen, & Carson, 1997; Carson, Flores, & Meade, 2000; Carson, Groves, & Machina, 1999; Herriges & Shogren, 1996). As a result, the single-bounded dichotomous choice elicitation technique is preferred.

THE PORTLAND SURVEY

This research uses analysis of CV survey results to measure the value that Portland area residents place on the potential consumption benefits associated with hosting an MLB team. This value can be used to determine the extent to which such benefits justify a public investment in a new baseball stadium. The survey includes follow-up questions designed to determine the elements that compose WTP for professional baseball in Portland. Statistical analysis of explanatory variables is used to derive option and existence value. By determining the incidence of benefits, this information can help develop an equitable local financing plan. Localities rely on a variety of revenue sources to repay stadium bonds; some affect only those who attend games (ticket surcharges), while others are more broadly applied (additional sales or property taxes, or tax

increment financing mechanisms). Although ticket surcharges or user-fees are now more common in financing packages, the vast majority of public investment in sports facilities comes from nonuser sources (Rappaport & Wilkerson, 2001). Such an arrangement can only be justified if evidence suggests that external or public goods benefits outweigh benefits related to anticipated or actual use. Because public consumption benefits do not stop at the city line, the survey elicits responses from residents of Portland and its surrounding counties. Statistical analysis is used to determine the level of benefits that would accrue to each locality, and which can help determine whether a regional cost-sharing plan would be warranted.

The Portland State University Survey Research Lab administered the CV survey by telephone, using a random-digit-dialing sample of residential telephone numbers within the Portland metropolitan area (defined as Multnomah County, Clackamas County and Washington County). The sample population represents the population who would likely receive consumption benefits and who could potentially contribute to the local subsidy required for stadium construction.

The survey contains four sections, labeled A, B, C, and D. Section A of the survey obtains information about respondents' attitudes and preferences regarding existing sports teams in Portland. These questions determine whether respondents attend sporting events in Portland and whether they receive public consumption benefits by regularly discussing or reading about sports in Portland.

Section B of the survey introduces the hypothetical MLB scenario and presents respondents with the WTP elicitation questions. The survey script provides some context regarding the efforts of various local groups to bring an MLB team to Portland. Respondents are informed that several baseball teams are considering moving in the near future, and that Portland is considered a top contender to host a team. They are also told that construction of a new stadium in Portland would likely require local public funding that could result in an increase in taxes for a 30-year period. Respondents are asked to suppose that construction of a new stadium would ensure the relocation of an MLB team to Portland. Each respondent's WTP is elicited with a dichotomous referendum question, followed up by a continuous choice question.

The initial referendum question asks, "How would you vote on a referendum that would provide public funding for the stadium, if it would increase the amount of taxes you pay *each* year by $*X*." Respondents are presented with a randomly assigned amount from the following set of bid prices: $5, $10, $20, $40, $60. The bid prices were determined by examining a WTP distribution obtained from a pretest using the approach described by Alberini (1995), Kanninen (1995), and Boyle (2003).

The referendum question is followed by a continuous choice WTP question that asks, "What is the *most* you would be willing to pay out of your own household budget *each* year in additional taxes to make a new stadium possible?" Respondents are given an option of seven price sets, which range from zero to "more than $80."

I have chosen to elicit WTP with both a dichotomous choice question and a continuous choice question because this approach allows for added analytical utility. Obtaining a measure of average WTP from responses to the continuous choice question requires only a straightforward calculation. Analysis of the referendum question requires more complicated logit estimation procedure. The ability to compare the estimates generated by these two procedures provides a measure of reliability.

As described above, the payment vehicle is a tax increase. Because some people might have an aversion to taxes for a variety of reasons, including a distrust of government or an unwillingness to impose taxes on others, this payment vehicle could impact stated WTP. If a respondent were averse to taxes he might indicate a low WTP even is he would receive some benefit from having an MLB team in Portland. I do not consider this effect to be bias. In this case the tax becomes a part of the good that is being valued, and WTP reflects a person's utility from MLB *if it involves a tax*.

Since in reality, public funding for a new stadium would likely create some form of tax burden (either direct or indirect) it is important to include the effect of a tax increase in the calculation of public consumption benefits.

Section C of the survey obtains information about respondents' attitudes toward the idea of attracting MLB to Portland. The variables developed in this section can be used as covariates to determine the components that make up WTP. Respondents are asked how many MLB games they would attend at the hypothetical new stadium. This question provides a variable that represents option value (or anticipated use value). Respondents are then presented with a set of statements and are asked to indicate their level of agreement with each, using a five-point Lykert scale. The following statements determine evidence of public consumption benefits:

- I would read about a Portland Major League Baseball team.
- I would watch a Portland Major League Baseball team on television.
- Hosting Major League Baseball would improve Portland's image or national reputation.
- A Major League Baseball team would make Portland a better place to live.

Section D of the survey records demographic characteristics that can be included as control variables in estimating a WTP function.

SURVEY RESULTS AND ANALYSIS

The CV survey was conducted between February 24 and March 21, 2005. A total of 365 interviews were completed from a pool of 2,583 eligible telephone numbers, for a response rate of 14.1%. A sample of this size from a target population of 570,000 households should limit sampling error to less than 5% (Dillman, 2000). As summarized in Table 1, the demographic characteristics of the survey respondents closely resemble those of the population from which they were drawn.

Results from section A of the survey indicate that most respondents do not receive substantial use *or* existence benefits from Portland's current professional sports scene. About 30% attended at least one Trail Blazers, Beavers or Timbers game during the past year, and fewer than 30% watched more than five games on television. Approximately 42% of respondents read about Portland's sports teams a few days a week or more, and less than 34% discuss the teams a few days a week or more.

Results from section C of the survey show that respondent's attitudes about major league baseball are more positive than their attitudes about Portland's existing sports teams. Most indicated that they would expect to receive use and existence benefits from bringing an MLB team to Portland. The mean number of games respondents would attend each season if Portland attracted an

TABLE 1

Summary of Demographic Characteristics

	Survey respondents	Target population (2000 census data)
Percent Male	41%	49%
Percent White	91%	86%
Median Age	50	40–44
Mean Household Size	2.7	2.5
Median Household Income	$45,000–$59,999	$45,000–$49,999
Median Educational Attainment	Some college	Some college

MLB team is 6; the majority of fans claimed they would attend at least 2 games. About 60% somewhat or strongly agreed that they would read about a Portland MLB team, and 61% agreed that they would watch the team on television. More than 64% of respondents somewhat or strongly agreed that hosting an MLB team would improve Portland's national image, while 42% agreed that MLB would make Portland a better place to live.

Respondents also revealed negative feelings regarding some aspects of bringing MLB to Portland. A large majority of respondents (85%) somewhat or strongly agreed that Portland has more pressing social issues that should be addressed before public money is spent on a sports stadium. (Over 65% strongly agreed with this statement). This can be associated with a concern about the opportunity costs of public spending. Most respondents (54%) agreed that hosting an MLB team would divert police resources, and 86% agreed that an MLB stadium would increase traffic congestion. Respondents indicated a skepticism regarding public spending, with 89% agreeing that building a stadium is likely to cost taxpayers more than they are originally told. Only 44%s of respondents somewhat or strongly agreed that building professional sports facilities is a proper use of public money.

Estimating a WTP Function from Continuous Choice Responses

Table 2 summarizes the results of the continuous choice WTP question (*WTP max*). After coding responses at the midpoint of each range and conservatively coding the highest amount at $80, mean WTP is calculated as $13.66; however, the median WTP is zero. The majority of respondents (54%) indicated that they would not be willing to pay *any* additional taxes to make a new stadium possible. The peculiar ramifications of a zero median WTP coupled with a positive mean WTP will be addressed in the discussion and implications section following the presentation of the survey results.

The most common reason that respondents provided for a positive WTP was a belief that an MLB team and stadium would improve the local economy. Almost half of the 168 respondents who answered this question selected that option. In addition, in section C of the survey, 69% of all respondents somewhat or strongly agreed with the statement that building an MLB stadium would improve Portland's economy. This indicates the persistence of misconceptions regarding the economic benefits of sports development strategies.

The majority of those who said they would *not* be willing to pay additional taxes to make a new stadium possible indicated a concern about the opportunity costs of such spending. About 51%

TABLE 2

Willingness-To-Pay; Continuous Choice Responses

B2. From the following choices, what is the most you would be willing to pay out of your own household budget each year in additional taxes to make a new stadium possible?

	Frequency	Percent
Zero	197	54.0%
Between $1 and $4.99	28	7.7%
Between $5 and $9.99	24	6.6%
Between $10 and $19.99	37	10.1%
Between $20 and $39.99	27	7.4%
Between $40 and $59.99	23	6.3%
Between $50 and $79.99	10	2.7%
More than $80	19	5.2%
Total	365	100%

TABLE 3

OLS Regressions, Variables and Summary Statistics

Variable	Description	Mean	Min	Max	Std Dev	*n*
WTP max	Amount respondent is willing to pay each year in additional taxes to support stadium construction	14.35	0	80	23.56	310
ATTEND	Number of Portland MLB games respondent would attend each season	6.05	0	81	10.95	310
EXISTENCE VALUE Vector	Sum of four dummy variables (READ dummy, WATCH dummy, IMAGE dummy, QOL dummy) that represent the existence of anticipated public consumption benefits	2.27	0	4	1.51	310
INCOME	Respondent's household income before taxes last year	4.25	1	8	2.03	310
TAX AVERSE dummy	1 if respondent somewhat or strongly agrees with the statement, "my taxes are currently too high"	0.71	0	1	0.45	310
ECONOMY dummy	1 if respondent somewhat or strongly agrees that building an MLB stadium would improve Portland's economy	0.69	0	1	0.46	310
PRIORITIES dummy	1 if respondent somewhat or strongly agrees that Portland has more pressing social issues that should be addressed before public money is spent on a sports stadium	0.84	0	1	0.37	310

of those with a zero WTP selected "the Portland area has more pressing social issues that should be addressed before public money is spent on sports stadiums" as the reason that best describes why they were not willing to pay. Another 31% selected, "taxes should not be used to pay for professional baseball stadiums."

In order to determine the elements that contribute to WTP, the variable *WTP max* can be regressed on variables that represent potential predictors. Two ordinary least squares (OLS) regression equations are developed to disaggregate WTP into its various components. Table 3 provides definitions and summary statistics for the variables included in the OLS regression models.

Rather than including individual independent variables to represent elements of existence value, I have chosen to use a vector of four variables. The vector *EXISTENCE VALUE* is the sum of the variables *READ dummy*, *WATCH dummy*, *IMAGE dummy*, and *QOL dummy*, which are based on Lykert scale statements from section C of the survey. The variable *READ dummy* takes on a value of 1 for respondents who somewhat or strongly agree that they would read about a Portland MLB team. *WATCH dummy* is equal to 1 for respondents who somewhat or strongly agree that they would watch a Portland MLB team on television. *IMAGE dummy* is equal to 1 for respondents who agree that hosting an MLB team would improve Portland's image or national reputation. *QOL dummy* is equal to 1 for respondents who agree that an MLB team would make Portland a better place to live. Values for the vector range from 0 to 4, with 4 representing the highest degree of anticipated public consumption benefits. Using a vector eliminates the possibility of multicollinearity among individual existence value variables.

TABLE 4

OLS Regression 1, Results

Dependent Variable: WTP Max					
	ß	*t*-Value	Significance level	HC *t*-value	HC significance level
Constant	−9.7859	−3.2353	0.0013	−3.9300	0.0001
ATTEND	0.4211**	3.6966	0.0003	2.5520	0.0107
EXISTENCE VALUE Vector	6.1683**	7.5237	0.0000	7.9540	0.0000
INCOME	1.7889**	3.2079	0.0015	3.0030	0.0027

$F = 44.25$, R-squared $= 0.30$.
** Indicates significance at $p < 0.05$.
HC = heteroskedasticity-consistent.

OLS Regression 1 reflects the a priori assumption of this research that WTP is a function of option value (anticipated use value) and existence value. The dependant variable *WTP max* is regressed on the number of games respondents would expect to attend each season if Portland were to host an MLB team (to represent option value), the four-variable existence value vector described above, and an income variable. The *n* for this analysis is limited to 310 respondents due to item nonresponse, most of which is attributable to the income variable. (About 13% of respondents did not provide information regarding their household income; however, an *n* of 310 is sufficiently large for this analysis.) The mean of *WTP max* for these 310 respondents is $14.35. Table 4 summarizes the findings of *OLS Regression 1*.

Both the option value and existence value variables are significant determinants of WTP. The significant positive coefficient for the income variable indicates that WTP increases with income, consistent with economic theory.

Solving the regression equation at the mean of each of the independent variables yields the mean WTP of $14.35. An estimate of mean existence value is obtained by setting the option value variable (*ATTEND*) equal to zero and solving the equation at the mean of the remaining variables. This calculation yields an existence value estimate of $11.82, which indicates that existence value makes a much greater contribution to total economic value than does anticipated use value. Mean option value is calculated to be $2.35, the difference between total value and existence value.

OLS Regression 2 includes three additional variables as potential determinants of WTP (see descriptions in Table 3.). The variables PRIORITIES dummy and ECONOMY dummy are included, based on the statements that respondents most commonly selected to describe why they would be willing or unwilling to pay additional taxes to support a stadium. (These variables were also found to be significant predictors of a positive WTP in a separate logit regression analysis.) The variable TAX AVERSION dummy is also included to test whether respondents' attitudes about their current tax burden influences WTP. The results of *OLS Regression 2* are summarized in Table 5.

As in model 1, the option value, existence value, and income variables are significant positive predictors of WTP. The coefficients of *ATTEND* and *INCOME* are similar to those in model 1; however, the coefficient of the *EXISTENCE VALUE vector* is smaller. Part of the positive impact on WTP that was assigned to the existence value variable in the simpler model is assigned to the *ECONOMY dummy* variable here.[1]

Again, solving the regression equation at the mean of each of the independent variables yields the mean WTP. This is illustrated in Table 6, which summarizes the contribution of each variable to mean WTP.

TABLE 5

OLS Regression 2, Results

Dependent Variable: WTP Max					
	β	*t*-value	Significance level	HC *t*-value	HC significance level
Constant	0.4272	0.0916	0.9271	0.0900	0.9286
ATTEND	0.4075**	3.6349	0.0003	2.3900	0.0168
EXISTENCE VALUE Vector	4.4082**	4.5359	0.0000	4.7830	0.0000
INCOME	1.7271**	3.1814	0.0016	3.0250	0.0025
TAX AVERSE dummy	−6.4456**	−2.6306	0.0090	−2.4330	0.0150
ECONOMY dummy	6.7348**	2.2662	0.0241	3.2680	0.0011
PRIORITIES dummy	−7.0976**	−2.2419	0.0257	−1.9250	0.0542

$F = 26.74$, R-squared $= 0.35$.
** Indicates significance at $p < 0.05$.
HC = heteroskedasticity-consistent.

Setting *ATTEND* equal to zero yields a mean existence value of $11.88, similar to the value calculated from model 1; however, the impact of the *ECONOMY dummy* variable must also be considered in determining mean existence value. For the mean respondent, a belief that economic development benefits accompany stadium construction contributes $4.67 to WTP. Since this cannot be considered an element of existence value, the *ECONOMY dummy* variable should also be set equal to zero to calculate a true estimate of the mean existence value. In this case, mean existence value is calculated as $7.22. Mean option value of $2.46 is calculated by subtracting existence value and the contribution of the *ECONOMY dummy* variable from total value.

Model 2 shows that the *PRIORITIES dummy* variable had a significant negative on WTP. For the average respondent, a concern that Portland has more pressing priorities for its public resources decreased WTP by $5.95. The significant negative coefficient on the *TAX AVERSE dummy* variable gives an indication of how WTP was impacted by respondent's attitudes about taxes. Without an aversion to taxes (setting *TAX AVERSE dummy* equal to zero), mean WTP would have been $4.60 higher.

A larger OLS regression model contained a variety of additional demographic independent variables, but none were significantly related to *WTP max*. Dummy variables representing location were not significant; indicating that the benefits associated with a Portland MLB team would not vary by county and would not be significantly different for those who live within the city of

TABLE 6

OLS Regression 2, Components of WTP

	β		Mean	Contribution to mean WTP
Constant	0.4272			$0.43
ATTEND	0.4075	×	6.05 =	$2.46
EXISTENCE VALUE Vector	4.4082	×	2.27 =	$10.00
INCOME	1.7271	×	4.25 =	$7.34
TAX AVERSE dummy	−6.4456	×	0.71 =	$−4.60
ECONOMY dummy	6.7348	×	0.69 =	$4.67
PRIORITIES dummy	−7.0976	×	0.84 =	$−5.95
Mean WTP			$14.35	

Portland. Because of the order in which the questions were asked, it is possible that the bid amount offered in the referendum could have an anchoring effect on responses to the continuous choice WTP question. To test for this, the bid amount offered was included as a potential explanatory variable in the larger OLS model. Bid amount did not have a significant impact on *WTP max*.

Recall that 54% of the sample gave a response of zero to the continuous choice WTP question. The result is a clustering of the dependent variable (*WTP max*) at zero. OLS regression is often avoided in favor of a Tobit model when the dependent variable is concentrated at zero; however the Tobit model does not seem appropriate in this case. A Tobit model is generally applied to overcome issues that arise when the dependent variable is *censored*; meaning values for the dependent variable below or above some threshold are not observed (Maddala, 2002). For example, if the dependent variable were income, and negative incomes (e.g., from business losses) were coded as zero, the dependent variable would be censored at zero. In this case, some of the responses for the dependent variable would take on a value of zero simply due to nonobservability (Crown, 1998). To say that *WTP max* is censored at zero would be to assume that the variable could, in principle, take on a negative value, which seems very improbable. It is far more likely that zero values for *WTP max* are legitimate representations of respondents' preferences, rather than representations of nonobserved values.[2]

Estimating WTP from Referendum Responses

Because the dichotomous choice referendum approach provides less information than a continuous choice elicitation question, estimating median and mean WTP requires statistical inference. By plotting the probability of a yes vote at each bid amount, the analyst can develop a histogram that traces out an inverse cumulative distribution function of WTP, as illustrated in Figure 1 (Loomis, 1988).

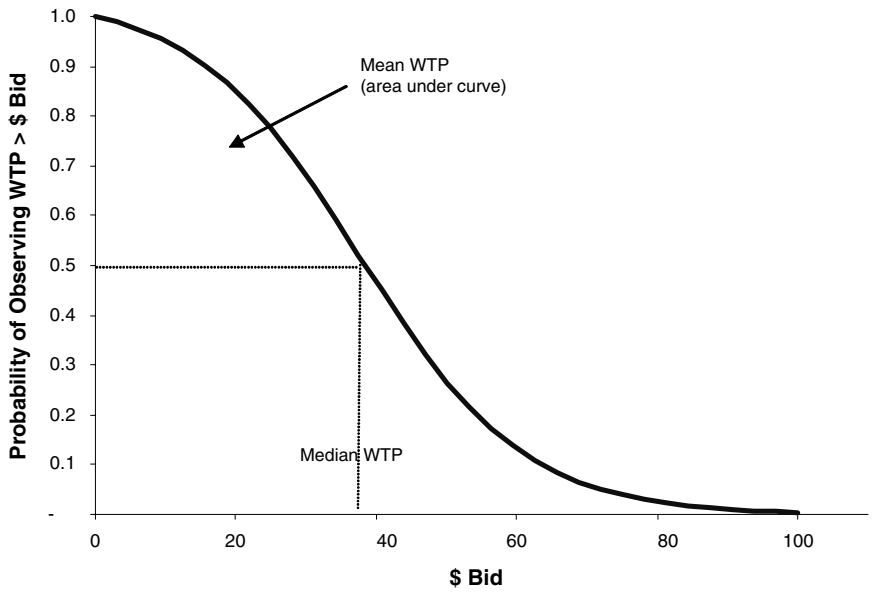

FIGURE 1

Example Logit Curve (Inverse Cumulative Distribution Function)

The area under this curve is the expected value, or mean, of WTP. A logit regression with the yes/no response as the dependent variable and bid price among the explanatory variables can be used to determine the inverse cumulative distribution function and illustrate the relationship between the bid amount and the probability of a yes response. Logit estimation can also be used to predict the probability that an individual with a particular set of characteristics will accept a particular bid amount.

Solving for the bid level that lets the probability of a yes vote equal .5 gives the median WTP (Hanemann, 1984). In a policy context, the median WTP can be very important, since it represents that cost, or tax level, at which a policy would be supported by 50% of the population. The median, however, cannot be properly aggregated over a larger population. Calculating the mean WTP from the logit analysis requires an additional step. The logit equation represents the inverse cumulative distribution function described above. Mean WTP can be calculated by integrating this function to solve for the area under the curve (Bateman et al., 2002). The same calculations can be made at various levels of each of the independent variables (Crown, 1998; Loomis, 1988). Solving for the bid amount that lets the probability equal .5 when the option value variable is set equal to zero provides a measure of median WTP based on existence value.

Using the *YES/NO* referendum vote as the dependent variable, a logit model was constructed that included the bid amount offered ($*BID*) as an independent variable along with each of the independent variables from *OLS Regression 2*. The variables *TAX AVERSE dummy* and *INCOME* were not significant predictors of a yes vote, so they were removed from the analysis.

As summarized in Table 7, option value and existence value were both found to have a significant impact on the probability of a yes vote, as were the *ECONOMY* and *PRIORITIES* dummy variables (each with the expected sign). After controlling for these variables, the bid amount offered was a significant determinant of a yes vote. Increasing the bid amount had a negative effect on the probability of a yes vote, as would be expected. As in the OLS models, additional demographic variables were also tested as explanatory variables, but none (including location) were found to be significant.

While the median response to the continuous choice WTP question is known to be zero, median WTP is estimated from the dichotomous choice question by solving for $*BID* where the probability of a yes response equals .5. Here this calculation yields a *negative* median WTP (−$49). While this would seem to mean that most respondents would require *compensation* for attracting and MLB team to Portland, this finding is better explained an artifact of the estimation method used.

Estimates of WTP from dichotomous choice data depend on the particular probability distribution function (PDF) used to model the results. A PDF describes the likelihood of observing a

TABLE 7

Logit Regression 1, Results

	Dependent Variable: YES/NO Vote			
Independent variable	β	Wald	Significance level	Odds ratio
Constant	−3.3962**	18.5173	0.0000	0.0335
$BID	−0.0139*	3.6448	0.0542	0.9862
ATTEND	0.0299**	2.7459	0.0975	1.0304
EXISTENCE VALUE Vector	0.8465**	36.6125	0.0000	2.3314
ECONOMY dummy	2.5907**	16.7951	0.0000	13.3397
PRIORITIES dummy	−1.3529**	9.3669	0.0022	0.2585

Chi-square = 212.57, df = 5.
** Indicates significance at $p < 0.05$, * indicates significance at $p < 0.10$.

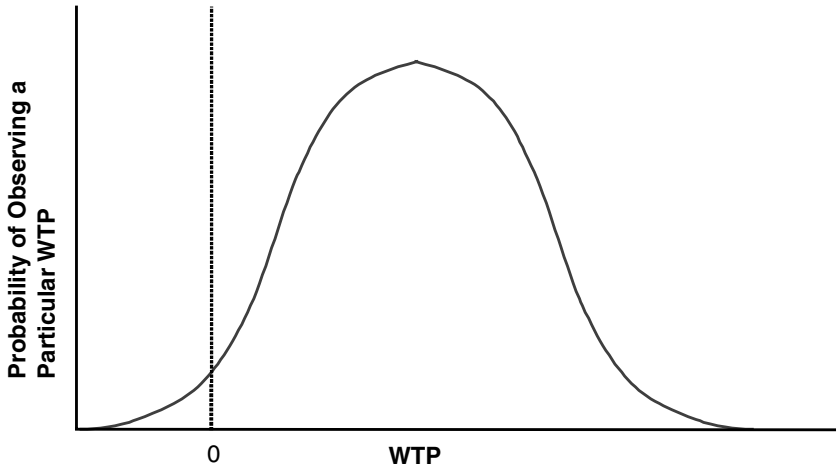

FIGURE 2

Example Probability Distribution Function

particular value of any random variable—in this case, WTP. The logistic distribution used in this model does not impose any restrictions on the values that can be taken by the WTP variable. (The distribution is defined across the range $-\infty$ to $+\infty$.) As a result, there is nothing stopping the logit model from predicting a positive probability of accepting a WTP less than zero, as illustrated in Figure 2 (Bateman et al., 2002).

Assuming that true WTP cannot take on a negative value, this model needs to be corrected. Predictions of negative WTP are fairly common among referendum-based CV models, and a number of alternative estimation techniques have been developed to address this issue (Bateman et al., 2002; Buckland, Macmillan, Duff, & Hanley, 1999; Haab & McConnell, 1997; Kristrom, 1997). One common solution is to fit the model with a probability distribution that is naturally nonnegative—such as the log-normal or Weibull distribution. This approach solves the problem of allowing for negative WTP, but it introduces another problem by ruling out the possibility of *zero* WTP (Bateman et al., 2002; Kristrom, 1997; Reiser & Shechter, 1999). It is very likely that for many Portlanders, the presence of an MLB team would not make any contribution to utility. For such respondents, the appropriate WTP would be zero. Using a PDF that assumes that all respondents have a *positive* WTP would likely lead to significantly biased estimates in this case.

The spike model, introduced by Kristrom (1997) removes the possibility of negative WTP and allows for zero WTP by separating respondents into two groups: one that does not value the hypothetical good in question and has a WTP of zero, and a second that has a positive WTP for provision of the good. The result is a probability distribution with a *spike* at zero, the height of which is equal to the probability of observing a zero WTP. This distribution is illustrated in Figure 3 (Bateman et al., 2002). Expected WTP for the entire sample is estimated by calculating the mean for those with a positive WTP (using standard logit analysis) and weighting the result by the percentage of respondents with a positive WTP (or 1 − the percentage of respondents with a zero WTP) (Buckland, Macmillan, Duff, & Hanley, 1999; Duffield & Patterson, 1991; Hanemann & Kristrom, 1995).

A simple referendum question does not provide enough information to determine whether a respondent has a zero WTP or a positive WTP, so surveys to be analyzed with a spike model generally contain a follow-up question that asks respondents if there is *any* amount they would

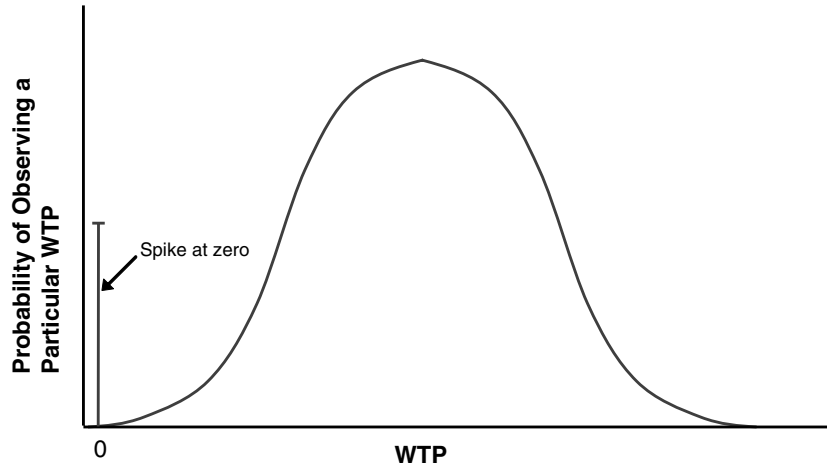

FIGURE 3

Example Spike Distribution

be willing to pay for the good in question. Those who answer no to this question comprise the zero WTP group. This purpose is served in the current survey by the continuous choice WTP question, which follows the referendum question and allows respondents to select a maximum WTP of zero.

As discussed above, 46% of the full sample (168 respondents) indicated a positive WTP. In order to estimate WTP from the referendum questions using a spike model approach, *Logit Regression 1* was recast with data from those respondents only. Table 8 summarizes the results of this analysis.

The independent variables remain significant predictors of a yes vote and retain their signs from the original model, except for the option value variable (*ATTEND*), which is not significant in this model. The mean WTP for those with a positive WTP is calculated by integrating the inverse cumulative distribution function over all positive values of $*BID* at the mean of each of the other independent variables. The mean WTP for this group is calculated as $121.44. Weighting this estimate by .46 (1 – the percentage of respondents with a zero WTP) provides an estimated of overall mean WTP of $65.58.

TABLE 8

Logit Regression 1, Respondents with Positive WTP

	Dependent Variable: YES/NO Vote			
Independent variable	β	Wald	Significance level	Odds ratio
Constant	0.1320	0.0082	0.9279	1.1411
$BID	−0.0269**	4.4923	0.0340	0.9735
ATTEND	0.0250	0.5093	0.4755	1.0253
EXISTENCE VALUE Vector	0.8835**	13.7391	0.0002	2.4192
ECONOMY dummy	1.8211**	3.9563	0.0467	6.1786
PRIORITIES dummy	−2.2691**	4.2395	0.0395	0.1034

Chi-square = 55.99, df = 5.
** indicates significance at $p < 0.05$.

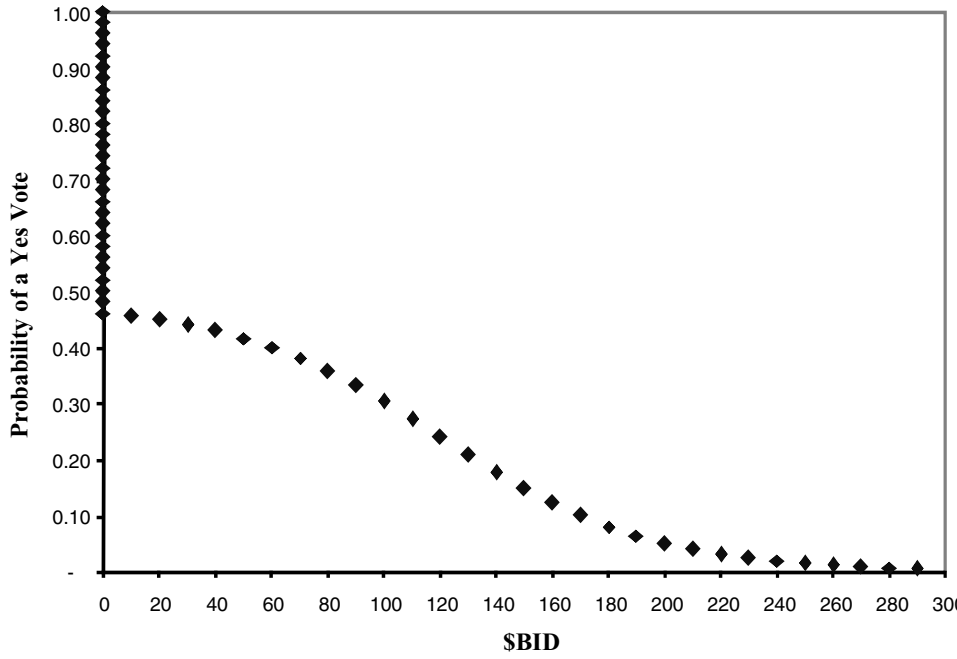

FIGURE 4

Inverse Cumulative Distribution with Spike at Zero

Because 54% of the sample (197 respondents) indicated a zero WTP, the conclusion of a zero median WTP carries through to the spike model estimation. This is illustrated in Figure 4, which shows the inverse cumulative distribution function for the full sample, including the spike at zero, and illustrates the relationship between amount and the probability of a yes vote.

Integrating the inverse cumulative distribution function over an *infinite* range of positive bid values, as was done in the above estimation, introduces several potential problems. First, the resulting value will be heavily influenced by the upper tail of the distribution and may reflect the values of only a small portion of the population. In addition, an infinite upper bound on WTP is inconsistent with budget constraints, and requires a projection well beyond the range of the data. These shortcomings are addressed by imposing an upper limit on the integration, commonly at the maximum bid offered in the survey, and calculating a *truncated* mean (Bateman et al., 2002; Boardman, Greenberg, Vining, & Weimer, 2001; Duffield & Patterson, 1991; Hanemann & Kristrom, 1995).

Truncation essentially discards that part of the probability mass that lies above the selected cutoff level; however, the distribution function continues to allot the *same* probabilities to observing values of WTP that are *below* the cutoff (Boardman, Greenberg, Vining, & Weimer, 2001). To control for this potential truncation bias, the probabilities below the truncation level are rescaled to account for the area removed from the upper tail of the distribution (Bateman et al., 2002; Boardman, Greenberg, Vining, & Weimer, 2001).

Using a cutoff of $60 (the maximum bid amount) and rescaling the probability distribution, the truncated mean is calculated to be $27.99. Weighting this figure by 0.46 gives an estimated mean WTP of $12.88 for the full sample, which is close to the mean generated by the continuous choice question.

Disaggregating WTP into its various components is complicated by the fact that respondents were split into two groups to accommodate the spike model. Disaggregation is achieved by examining mean WTP at different levels of the independent variables. While it is possible to determine mean WTP at various levels of the independent variables *for the group that is willing to pay something*, it is not possible to determine how a change in those independent variables would affect the percentage of the sample that is *in* that group, or what the characteristics of the remaining group would be. For example, the variables *ATTEND* and *ECONOMY dummy* could be set equal to zero to determine the contribution of existence value for the group with a positive WTP; however without the influence of these explanatory variables, some respondents might drop out of this group. As a result, the OLS model is a more appropriate tool for estimating a WTP function.

The ability to estimate mean WTP from both a continuous choice question and a dichotomous choice referendum allows for a measure of alternate-forms reliability. The mean generated from the continuous choice analysis ($14.35) is within $1.50 of the truncated mean estimated from the referendum responses ($12.88). Cross-tab analysis indicates that 92% of respondents reported a maximum WTP in the continuous choice question that was consistent with their referendum response, providing further evidence of reliability.[3]

Before turning to a discussion of the implications of these findings, a few limitations of the analysis should be noted or reemphasized. Although the sample size is sufficient to limit sampling error to less than 5%, the survey response rate was low, at 14.1%. As described above, the effective sample size was also diminished by nonresponse to the survey's income question.

The application of the spike model and the rejection of the Tobit model are based on the assumption that true WTP cannot take on a negative value in this case. Some residents might believe that a baseball stadium would generate negative externalities that would outweigh any potential benefits. Such residents would consider a stadium to be a disamenity, and could, therefore, have a negative WTP. It is not possible to discern whether this was the case for any of the respondents because the survey instrument did not offer an opportunity to indicate a negative WTP. While it would have been possible to include a negative WTP option in the continuous choice elicitation question, this would have likely caused confusion for some respondents and led others to reject the reality of the survey as well as the consequential nature of their responses. Including such an option could have also introduced potential bias, as those with an actual WTP of zero would have had an incentive to indicate a negative WTP if they truly believed that they would be compensated.

IMPLICATIONS AND DISCUSSION

Analyses of both the continuous choice question and hypothetical referendum generated WTP distributions that are skewed to the right, with a zero median and a positive mean. Large differences in median and mean WTP complicate the task of determining an appropriate level of public investment. The two measures have very different meanings with regard to decision making processes.

Median WTP reflects the benefit level of the majority of respondents, and selecting a level of public investment based on the median is akin to selecting the tax burden that would pass a vote. The preference of the median voter, however, will not necessarily lead to an outcome that is considered efficient by the standards of welfare economics. The *efficient* level of public investment lies just below the aggregated value of the *mean* WTP, since a tax to support stadium construction would create positive net benefits up to the point at which the tax burden per household equals mean WTP. Median WTP, however, might be more important to those concerned about the distribution of benefits.

TABLE 9

Public Investment Supported by Total Willingness-To-Pay

	Mean annual household WTP	Aggregate annual WTP	Net present value
Continuous Choice Estimate (OLS Regression 2)	$14.35	$8,179,500	$109,640,603
Referendum Estimate (Spike Logit Regression)	$12.88	$7,341,600	$98,409,126

As described in the case study description, the required local investment for stadium construction is likely to be around $235 million. Assuming it is supported by a 30-year bond with a 6.25% interest rate, the annual cost of this investment would be $17.53 million. Spread over the three-county area, this is equivalent to approximately $30.76 per household.

Based on the results of this research, it is clear that a tax large enough to support a $235 million stadium subsidy would not pass a referendum (assuming that the sample is an accurate reflection of potential voters). In fact, the results indicate that no level of taxation would receive majority support. The anticipated stadium investment would also exceed the amount that could be considered efficient. Table 9 shows the size of the public investment that would be supported by the respondents' mean WTP, as estimated from both the continuous choice and referendum analyses.

The mean annual household WTP calculated from the continuous choice responses is $14.35. When multiplied by the 570,000 households in the three-county metropolitan area, this mean yields an aggregate WTP estimate of approximately $8.18 million per year. Over a 30-year period, assuming a discount rate of 6.25%, this annual aggregate WTP estimate translates to a net present value of $109.64 million. Put another way, the aggregate WTP of $8.2 million per year could support the debt service on a $109.6 million 30-year bond issue with a 6.25% interest rate. The referendum analysis yields a mean WTP estimate of $12.88, which would support a capital investment of $98.41 million. In this case, stadium construction would only create net benefits if the level of public investment was less than $98.41 million.

An examination of option and existence value provides a starting point for determining the type of financing mechanisms that would be appropriate for a potential stadium subsidy. Table 10 summarizes the magnitude of capital investment that would be supported by existence and option value estimates calculated from *OLS Regression 2*.

The total capital investment that would be supported by a combination of consumption benefits is $73.96 million. The findings indicate that external or public goods benefits derived from hosting an MLB team would heavily outweigh benefits related to actual attendance. In this case, the benefit principle of taxations suggests that it would be appropriate to support the bulk of

TABLE 10

Public Investment Supported by Consumption Benefits

	Mean annual household value	Aggregate annual household value	Net present value
Existence Value	$7.22	$4,115,400	$55,164,122
Option Value	$2.46	$1,402,200	$18,795,532
			$73,959,654

the public investment with revenue generated from broad-based, nonuser sources, as has been typical of financing plans for current generation facilities. (Potential sources include tax increment financing as well as property and income tax levies.) Of course, developing a specific financing plan that would place the greatest cost on those with the greatest benefit would be a complicated endeavor. Any simple broad-based tax would unfairly place some of the financing burden on those who would derive little or no utility from MLB in Portland. Since WTP increases with income, an income tax approach would appropriately place a larger burden on residents with higher income. User-based revenue sources, such as ticket or concession surcharges, would also be an essential part of an appropriate financing plan, since about 17% of projected total benefits, and 25% of total consumption benefits, are related to anticipated attendance.

The survey results also suggest that an efficient and equitable financing plan would involve contributions from Multnomah, Clackamas, and Washington counties. A cost sharing approach is justified by the finding that projected benefits do not vary by location. Dummy variables indicating whether respondents lived in Clackamas County or Washington County were included as explanatory variables in versions of both the OLS and Logit regression analyses. Residing in either of those counties (as opposed to Multnomah County) did not have a significant impact on maximum WTP or the probability of voting yes to the hypothetical referendum. An additional dummy variable indicating whether respondents lived within the city of Portland was also tested and found to have no significant impact on the dependent variables. An independent sample *t*-test compared the mean WTP of respondents who lived within the city of Portland to those who did not. The means ($12.90 and $14.60, respectively) were not significantly different from one another. Considering that the majority of projected benefits are associated with existence value, the finding that benefits do not vary by location is not surprising. The external and public goods benefits associated with hosting a major league sports team do not stop at the city line.

The finding that is perhaps the most surprising is the extent to which respondents believe that stadium construction generates economic development, and the significant relationship between this belief and WTP. Several analyses in the previous section illustrated the importance of the *ECONOMY dummy* variable as a determinant of WTP. OLS regression analysis of the continuous choice responses showed that this belief contributes $4.67 to mean WTP (see Table 6). The logit analyses of the hypothetical referendum also indicated that those who believe in the economic benefits of stadium construction were more likely to vote yes, holding the bid amount constant (although it is not possible to determine the contribution of this belief to the overall mean WTP estimated by the spike model).

The significance of this variable as a determinant of WTP is surprising in the context of the motivation for this research. The purpose of this research is to move discussion of public investment in sports facilities beyond the usual economic catalyst debate by considering the importance of overlooked consumption benefits. This is based on an underlying belief that supporters of stadium investments are motivated *not* by the potential for economic development, but by the potential for consumption-related benefits. (In other words, supporters are likely to be more excited about the possibility of having games to attend and a home team to root for than they are about the jobs that a team might bring.) The findings of this research indicate, however, that people are indeed motivated to support this particular investment, in part, by the perceived potential for economic development.[4]

While a belief in the economic development benefits of stadium construction is a significant determinant of WTP, the survey findings confirm the presumption that consumption benefits are more important to those who support public investment. The WTP function estimated from *OLS Regression 2* indicates that consumption benefits comprise the majority of WTP (and the bulk of these benefits are associated with public consumption). The economic development belief contributes $4.67 to mean household WTP, which is equivalent to $35.68 million of the total

net present value of $109.64. As shown in Table 10, the sum of public and private consumption benefits accounts for $73.96 million in net present value. This figure better represents an efficient level of public investment, since numerous empirical studies have shown that sports facilities have little or no impact on metropolitan area employment or income.

There are likely a variety of factors related to the current political and economic climate of the Portland area that limit the willingness of local residents to support public investment in stadium construction. Residents of Multnomah County passed a temporary income tax increase in 2003, in part to prevent cuts to public education and social service budgets. The tax was a local response to state budget cuts and a poor economy (Multnomah County Voter's Pamphlet – May 2003 Special Election; Measure No. 26–48, 2003). In this context, local residents are likely to be very sensitive to issues of taxation and public spending options. Indeed, the results of *OLS Regression 2* identify respondents' attitudes about their current tax burden and a concern that Portland has more pressing priorities for its public resources as two factors that significantly detract from mean WTP. For the average respondent, a concern that Portland has more pressing priorities for its public resources decreased WTP by $5.95, while a belief that taxes are currently too high decreased WTP by $4.60. Only a combination of changes in respondents' attitudes that includes changes in these variables would lead to a WTP large enough to justify a $235 million subsidy.

The findings of this study indicate that, even in the absence of economic development benefits, the potential consumption benefits associated with hosting an MLB team in Portland would support a small stadium subsidy, assuming a Pareto efficiency standard. The projected benefits, however, are not nearly enough to justify the $235 million local investment that would likely be required. The efficient level of public investment based on projected consumption benefits would be approximately $74 million. Any investment beyond this amount would detract from the public welfare. Because the majority of projected benefits are associated with expected public goods and externalities, rather than anticipated attendance at games, an equitable financing plan would focus on nonuser revenue sources. Since the level of projected benefits does not vary by location, any public investment should be shared between Multnomah, Clackamas, and Washington Counties.

In the context of the Portland area's current political and economic circumstances, the willingness of residents to pay for stadium construction is tempered by a concern about other pressing social needs and a reaction to the current tax climate. Were these circumstances to change, a larger investment might be justified; however, hosting a second major league sports team might never be a high enough priority to Portlanders to justify a $235 million subsidy. The research model implemented here is completely transferable, and could be used to determine whether such an investment might be justified in another city, perhaps with bigger appetite for sports and a different political and economic climate.

This research examines whether the continued proliferation in public investment in major league sports facilities might be justified by the existence of consumption benefits. In cases where public investment exceeds the level that would be supported by consumption benefits, no such market failure justification exists. Factors related to the political economy of urban development remain likely potential motivators for investment in such cases. Danielson (1997), Euchner (1993), Keating (1997), Pelissero, Henschen, and Sidlow (1991), and Schimmel (2001) make the connection between growth coalition or urban regime influence and sports facility development. Research that continues to examine the composition of sports development regimes and their influence will remain important.

In addition to future studies, however, researchers must search for new ways to affect the public awareness of the political and economic realities of sports facility investments. Recall that nearly 70% of survey respondents either somewhat or strongly agreed with the statement, "building a Major League Baseball stadium would improve Portland's economy." The pervasiveness of this belief suggests that academic research has had little influence of public perception thus far. Perhaps

more can be done to make findings accessible to a broader audience. (The typical metropolitan resident is more likely to encounter campaign information that touts the projections of promotional economic impact analyses than he or she is to read through the pages of an academic journal.) Alternatively, future efforts could focus on finding ways for public administrators, including city planning practitioners, to embed the type of analysis proposed here into a collaborative decision-making process. Creating a community dialogue based on empirical evidence could help dispel persistent misconceptions about the economic development benefits of stadium construction and potentially disperse growth coalition influence.

ENDNOTES

1 Diagnostic statistics indicate that multicollinearity between ECONOMY dummy and EXISTENCE VALUE vector is not a concern. The tolerance statistic for ECONOMY dummy is 0.636, and the variance inflation factor (VIF) is 1.573. Generally, tolerance values <0.1 or VIF values >10 indicated the presence of multicollinearity.

2 Crown (1998) observes that even when zero is a seemingly plausible value for the dependant variable, clustering at zero can cause a violation of the OLS regression assumptions that residuals are normally distributed and have a constant variance. While diagnostic tests indicate that these assumptions are violated in OLS Regression 1 and OLS Regression 2, the findings of these models should not be considered invalid. The assumption that residuals are normally distributed could affect the estimated *t*-values; however, this assumption not considered to be crucial if the sample size is large (Crown, 1998; Malinvaud, 1966). In addition, the normality assumption is not needed to derive the formulas for the regression coefficients and standard errors, so a violation does not bias the regression coefficients (Crown, 1998). Heteroskedasticity (violation of the constant variance assumption) also leaves coefficients unbiased, but can render *t*-values and tests of significance invalid. However, it is possible to correct for the effect of heteroskedasticity and compute heteroskedasticity-consistent (HC) *t*-values and significance levels (White, 1980). Tables 4 and 5 report HC t-values generated by the econometrics software EasyReg using White's heteroskedasticity-consistent variance matrix. These values indicate that each of the explanatory variables remains statistically significant after correcting for the effect of heteroskedasticity. To be thorough, a Tobit regression was also conducted using the independent variables included in OLS Regression 2. The Tobit model produced similar results in terms of coefficient signs and significance of the explanatory variables. Results are available from the author upon request.

3 Consistency between referendum and continuous choice responses could mean (1) a no vote and a WTP max of zero; (2) a no vote and WTP max less than the rejected bid; or (3) a yes vote and a WTP max greater than or equal to the accepted bid.

4 It is possible that some of the respondents who indicated a belief in the economic development benefits of stadium construction were doing so to justify a support for public investment that was truly based on anticipated consumption benefits. If this was a common outcome, it would create multicollinearity between the independent variables ECONOMY dummy and EXISTENCE VALUE vector or ATTEND in the regression analyses. Diagnostic statistics indicated that multicollinearity was not a concern. It is likely that many respondents have simply been convinced by the economic-development-centered campaigns that have accompanied the many stadium development strategies of the last 15 years.

REFERENCES

Alberini, A. (1995). Optimal design for discrete choice contingent valuation surveys: Single-bound, double-bound, and bivariate models. *Journal of Environmental Economics and Management*, *28*, 287–306.

Alberini, A., Kanninen, B., & Carson, R. T. (1997). Modeling response incentive effects in dichotomous choice contingent valuation data. *Land Economics*, *73*(3), 309–324.

Arrow, K., Solow, R., Portney, P. R., Leamer, E. E., Radner, R., & Schuman, H. (1993). *Report of the NOAA Panel on Contingent Valuation*. Washington, DC: NOAA.

Baade, R. A. (1996). Professional sports as catalysts for metropolitan economic development. *Journal of Urban Affairs*, *18*(1), 1–17.

Baade, R. A. (2000). The impact of sports teams and facilities on neighborhood economies: What's the score? In W. S. Kern (Ed.), *The economics of sports* (pp. 21–47). Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Baade, R. A., & Dye, R. (1990). The impact of stadiums and professional sports on metropolitan area development. *Growth and Change*, *21*(2), 1–14.

Baade, R. A., & Sanderson, A. R. (1997). The employment effect of teams and sports facilities. In R. Noll & A. Zimbalist (Eds.), *Sports, jobs, and taxes: The economic impact of sports teams and stadiums* (pp. 92–118). Washington, DC: Brookings Institution Press.

Bateman, I. J., Carson, R. T., Day, B., Hanemann, M., Hanley, N., Hett, T., et al. (2002). *Economic valuation with stated preference techniques*. Northampton, MA: Edward Elgar.

Boardman, A. E., Greenberg, D. H., Vining, A. R., & Weimer, D. L. (2001). Valuing impacts through surveys: Contingent valuation. In *Cost-benefit analysis: Concepts and practice* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

Boyle, K. J. (2003). Contingent valuation in practice. In P. A. Champ, K. J. Boyle, & T. C. Brown (Eds.), *A primer on nonmarket valuation*. Boston: Kluwer Academic Publishers.

Buckland, S. T., Macmillan, D. C., Duff, E. I., & Hanley, N. (1999). Estimating mean willingness to pay from dichotomous choice contingent valuation studies. *The Statistician*, *48*, 109–124.

Carlino, G., & Coulson, N. E. (2004). Compensating differentials and the social benefits of the NFL. *Journal of Urban Economics*, *56*, 25–50.

Carson, R. T., Flores, N. E., Martin, K. M., & Wright, J. L. (1996). Contingent valuation and revealed preference methodologies: Comparing the estimates for quasi-public goods. *Land Economics*, *72*(1), 80–99.

Carson, R. T., Flores, N. E., & Meade, N. F. (2001). Contingent valuation: Controversies and evidence. *Environmental and Resource Economics*, *19*(2), 173–210.

Carson, R. T., Groves, T., & Machina, M. J. (1999). *Incentive and informational properties of preference questions*. Paper presented at the European Association of Resource and Environmental Economists, Oslo, Norway.

Coates, D., & Humphreys, B. R. (1999). The growth effects of sport franchises, stadia, and arenas. *Journal of Policy Analysis and Management*, *18*(4), 601–624.

Crown, W. H. (1998). *Statistical models for the social and behavioral sciences*. Westport, CT: Praeger Publishers.

Danielson, M. N. (1997). *Home team: Professional sports and the american metropolis*. Princeton, NJ: Princeton University Press.

Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method*. New York: John Wiley & Sons, Inc.

Duffield, J. W., & Patterson, D. A. (1991). Inference and optimal design for a welfare measure in dichotomous choice contingent valuation. *Land Economics*, *67*(2), 225–239.

Euchner, C. (1993). *Playing the field: Why sports teams move and cities fight to keep them*. Baltimore: The Johns Hopkins University Press.

The Finance Plan (2004, August 26). From http://4.18.227.209/submission/pdx_finance_mlb_082604.pdf.

Haab, T., & McConnell, K. E. (1997). Referendum models and negative willingness to pay: Alternative solutions. *Journal of Environmental Economics and Management*, *32*, 251–270.

Hanemann, M. (1984). Welfare evaluations in contingent valuation experiments with discrete responses. *American Journal of Agricultural Economics*, *66*, 332–341.

Hanemann, M., & Kristrom, B. (1995). Preference uncertainty, optimal designs and spikes. In P.-O. Johansson, B. Kristrom, & K.-G. Maler (Eds.), *Current issues in environmental economics*. Manchester: Manchester University Press.

Hanemann, W. M., & Kanninen, B. (1999). The statistical analysis of discrete-response CV data. In I. J. Bateman & K. G. Willis (Eds.), *Valuing environmental preferences*. Oxford: Oxford University Press.

Herriges, J. A., & Shogren, J. F. (1996). Starting point bias in dichotomous choice valuation with follow-up questioning. *Journal of Environmental Economics and Management*, *30*, 112–128.

Irani, D. (1997). Public subsidies to stadiums: Do the costs outweigh the benefits? *Public Finance Review*, *25*(2), 238–253.

Johnson, B. K., Groothius, P. A., & Whitehead, J. C. (2001). The value of public goods generated by a major league sports team. *Journal of Sports Economics*, *2*(1), 6–21.

Johnson, B. K., & Whitehead, J. C. (2000). Value of public goods from sports stadiums: The CVM approach. *Contemporary Economic Policy*, *18*(1), 48–58.

Kanninen, B. (1995). Bias in discrete response contingent valuation. *Journal of Environmental Economics and Management*, *28*(1), 114–125.

Keating, D. W. (1997). Cleveland and the 'comeback' city: The politics of redevelopment amidst urban decline. In M. Lauria (Ed.), *Reconstructing urban regime theory: Regulating urban politics in a global economy* (pp. 189–205). New York: McGraw Hill.

Kristrom, B. (1997). Spike models in contingent valuation. *American Journal of Agricultural Economics*, *79*, 1013–1023.

Loomis, J. B. (1988). Contingent valuation using dichotomous choice models. *Journal of Leisure Research*, *20*(1), 46–56.

Maddala, G. S. (2002). *Introduction to econometrics*. West Sussex: John Wiley & Sons.

Malinvaud, E. (1966). *Statistical methods of econometrics.* Chicago: Rand McNally.

Mitchell, R. C., & Carson, R. T. (1989). *Using surveys to value public goods: The contingent valuation methodology*. Washington, DC: Resources for the Future.

Multnomah County Voter's Pamphlet—May 2003 Special Election; Measure No. 26-48 (2003). From http://www.co.multnomah.or.us/dss/elections/2003-05/vp/26-48.html.

Noll, R., & Zimbalist, A. (1997). The economic impact of sports teams and facilities. In R. Noll & A. Zimbalist (Eds.), *Sports, jobs and taxes: The economic impact of sports teams and facilities* (pp. 55–91). Washington, DC: Brookings Institution Press.

Park, T., Loomis, J. B., & Creel, M. (1991). Confidence intervals for evaluating benefits estimates from dichotomous choice contingent valuation studies. *Land Economics*, *67*(1), 64–73.

Pelissero, J. P., Henschen, B. M., & Sidlow, E. I. (1991). Urban regimes, sports stadiums, and the politics of economic development agendas in Chicago. *Review of Policy Research*, *10*(2–3), 117–129.

Portney, P. R. (1994). The contingent valuation debate: Why economists should care. *Journal of Economic Perspectives*, *8*(4), 3–17.

Rappaport, J., & Wilkerson, C. (2001). What are the benefits of hosting a major league sports franchise? *Economic Review, Federal Reserve Bank of Kansas City* (First Quarter), 55–86.

Reiser, B., & Shechter, M. (1999). Incorporating zero values in the economic valuation of environmental program benefits. *Environmetrics*, *10*, 87–101.

Rosentraub, M. S. (1997). *Major league losers: The real cost of sports and who's paying for it*. New York: Basic Books.

Rosentraub, M. S., & Swindell, D. (1998). Who benefits from the presence of professional sports teams? *Public Administration Review*, *58*(1), 10–21.

Schimmel, K. (2001). Sports matters: Urban regime theory and urban regeneration in the late-capitalist era. In C. Gratton & I. P. Henry (Eds.), *Sport in the city: The role of sport in economic and social regeneration* (pp. 259–277). London: Routledge.

Series Interest (2002, November 1, 2002). *The Oregonian*.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator, and a direct test for heteroskedasticity. *Econometrica*, *48*, 817–838.

Zimbalist, A. (1998). The economics of stadiums, teams and cities. *Policy Studies Review*, *15*(1), 17–29.

Zimmerman, D. (1997). Subsidizing stadiums: Who benefits, who pays? In R. Noll & A. Zimbalist (Eds.), *Sports, jobs and taxes: The economic impact of sports teams and stadiums*. Washington, DC: Brookings Institution Press.