

# DEMAND FOR SPORT

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*This article reviews international literature on the demand for professional sport. The first part presents a conceptual framework for understanding the sources and determinants of the demand for professional sporting contests. The second part reviews empirical evidence on key determinants of attendance at sporting events, and on other sources of demand, such as broadcasting, sponsorship, and merchandising. The review concludes that there is still much to be learned about demand for professional sport, and that there are no simple lessons to be drawn from existing literature. But important messages do emerge from studies of demand for attendance with regard to effects of uncertainty of outcome, quality of contest, and quality of viewing.*

## I. INTRODUCTION

The topic of demand for sport has in recent times attracted substantial attention in the fields of sports economics and marketing. For example, Appendix Table A1—which lists econometric studies of determinants of attendance at professional sporting competitions—includes more than 60 studies. This high level of interest in demand for professional sporting competitions appears to have two main explanations. First, consistent with Walter Neale's (1964) classic article, the 'peculiar' nature of the demand-side of markets for professional sporting competitions has undoubtedly promoted interest in the topic. Where else, for example, would you find consumers (fans who attend matches) who then become part of a product that is bought by other

consumers (fans who watch on TV)? Or a situation where consumers do not necessarily like the idea of unfettered competition between participants on the other side of the market? Second, the economic significance of professional sports (see for example, Fort, 2003, ch. 1), and the importance of understanding about the determinants of demand for key decision-makers in professional sports and government, make it an important research topic for a variety of stakeholders.

The main objective of this article is to review international literature on demand for professional sport and, in particular, to suggest lessons for decision-makers in both the professional sport industry and in government. (Extensive reviews of research on demand for sports have previously been

presented by Cairns *et al.* (1986) and Downard and Dawson (2000).) The article is divided into two main parts. In the first part a conceptual framework for understanding the sources and determinants of the demand for professional sporting contests is presented. The second part contains a review of empirical evidence on key determinants of attendance at sporting events, and on other sources of demand such as broadcasting, sponsorship, and merchandising.

## II. PROFESSIONAL SPORT—WHAT IS THE ‘PRODUCT’?

A detailed discussion of the demand for professional sport cannot proceed without first answering the question, what product is being demanded? In professional sport the core product is the game or contest between two teams—as Sutton and Parrett (1992, p. 8) state:

the core product is defined as the game itself, that is whatever takes place on the field of play including the manner in which the contest is conducted, the style and strategy employed and the interpretation of understood laws, rules, regulations and historical precedents.

The seasonal (or annual) round-robin tournament format (or ‘pennant race’ in North American parlance), common to most professional sports, then creates the ‘league product’. Importantly, the league product is greater than the mere sum of the individual sporting contests. The league product includes a series of individual contests, but also has additional saleable and non-saleable elements such as licensed reproduction of the seasonal fixture list and non-saleable externalities such as the ‘league standing effect’.

The essence of demand for the game or sporting contest is ‘fan interest’. This interest is manifested in watching or listening to a description of the contest (live or on TV/radio), buying products associated with the contest (for example, team merchandise, products of team sponsors, or gambling), or ‘following’ the contest (for example, reading newspaper reports) (Neale, 1964).

The utility that fans obtain from these sources can be considered to derive from, first, identification

with a team in the sporting contest and, second, the ‘quality of the contest’. On the first point it is generally accepted that fan interest is ‘enhanced by an association to a specific team or its competitors’ (Mason, 1999, p. 405). Typically, fan identification with a team is founded on a geographic or emotional connection, and has a strong basis in the self-identity of the fan. On the second point, there are two main dimensions of quality of contest—demonstration of physical or mental capability, and uncertainty of outcome. For example, Rottenberg (2000, p. 11) argues that: ‘The quality of a game is higher, the more grace and skill with which it is produced, the larger the number of instances of extraordinary physical achievement that appear in it’; and Madrigal (1995, p. 206) suggests that a sporting contest is ‘a hedonistic experience in which the event itself elicits a sense of drama’ where the level of drama will depend on the degree of uncertainty of outcome.

An economic approach to studying demand for sporting contests identifies both ‘direct’ demands and ‘derived’ demands. Direct demand exists where a consumer derives utility from the sporting contest. Types of direct demand are: (a) demand for live attendance at sporting contests; and (b) demand for watching sporting contests on a pay-per-view basis. Derived demand is where the sporting contest is used as an input in production of another good or service. Derived demand includes: (a) television, radio, and Internet broadcasters seeking inputs to the production of programming content to sell to advertisers and/or to sell on a subscription or pay-per-view basis to individuals and organizations; (b) organizations seeking inputs to marketing campaigns to establish or enhance the brand name and reputation of their products through advertising and/or sponsorship; (c) organizations selling merchandise (for example, clothing) with an ‘identity’ associated with sporting teams, leagues, events, or individual athletes; (d) stadium/venue owners seeking inputs to the production of an ‘entertainment package’ to sell seats at their stadiums to individuals and organizations and to sell marketing opportunities to advertisers/sponsors; (e) governments seeking inputs to the production of a set of ‘events’ that will increase economic activity in a region or country by, for example, attracting tourists, or to encourage participation in sport as part of promotion of healthy

lifestyles; (f) organizations seeking inputs to the production of gambling and/or 'fantasy sport' products; and (g) the media as a type of 'news'.

Sports marketing and management scholars have also developed typologies to identify different sources of demand in terms of types of sports fans (e.g. Stewart and Smith, 1996; Hunt *et al.*, 1999; Quick, 2000; Guilianotti, 2002). These typologies build on research that explains the structural relationship between fan interest or 'fandom' and various psychological and sociological factors (e.g. Kahle *et al.*, 1996; Wann *et al.*, 1999; Funk and James, 2001; Van Leeuwen *et al.*, 2002). The broad conclusions from this research correlate with the approach of the economic literature.

### III. WHY IS DEMAND OF INTEREST?

Understanding about the nature and determinants of demand is arguably the most important empirical issue in analysis of professional sporting markets. Team owners and managers, sporting league administrators, and public policy-makers or regulators simply cannot make correct judgements on issues of vital importance to them, without having some knowledge about demand.

The objective of the team owner or manager is generally represented in the economics literature as being either to maximize profits or to maximize team seasonal winning percentage. For either type of objective, a critical aspect of team management will be to maximize or at least to increase team revenue. Revenue outcomes depend on a range of decisions that must be made by a team, and demand considerations will enter into most of these decisions. For example, home ticket sales (attendance) are in most sporting competitions a major source of revenue. Therefore, a sporting team must know the answer to questions such as: how does team home stadium location and quality affect attendance; how does ticket price affect attendance; and, how will selling live local TV rights affect attendance?

Most objectives of sporting leagues can ultimately be reduced to the idea of maximizing fan interest. Fan interest is, of course, the essence of demand, so that the activities of league administrators are integrally related to knowing about demand. For exam-

ple, with responsibility for the design of the sporting competition, the league administration must be concerned with issues such as how the geographic composition of teams in the league will affect live attendance and TV ratings, and with achieving a match quality and sufficiently even competition to maximize fan interest. As another example, in undertaking its role in collective negotiation of broadcast rights, a league administration will need to take into account the nexus between attendance and TV broadcasts.

Public policy-makers or competition regulators seek to maximize social welfare. Hence, they will have as their objective the implementation of policies or regulatory outcomes that ensure that the design and market structures of professional sporting competitions achieve goals of social efficiency and equity. Making judgements about optimal policies will require a variety of information on demand. One example is with regard to regulation of labour-market competition—for example, making an assessment of whether to allow labour-market restrictions in professional sporting markets that are claimed by a sporting league to enhance competitive balance. Such restrictions are likely to cause an anti-competitive detriment in the labour markets to which they are applied. Hence, a necessary condition for allowing the restrictions will be that benefit to consumers of sporting contests outweighs the anti-competitive detriment; but this requires that consumer demand should depend on competitive balance. This, in turn, requires an understanding of the determinants of attendance. Another example is with regard to design of sporting competitions—whether a promotion–relegation system or a 'division' system provides greater incentives for team performance and less scope for teams to exploit monopoly power will depend significantly on the nature of consumer demand (Ross and Szymanski, 2002).

### IV. DETERMINANTS OF ATTENDANCE—A THEORETICAL PERSPECTIVE

#### (i) Overview

The economic theory of demand for attendance at sporting events is based on a standard consumer-theory model. A representative consumer is as-

sumed to choose a consumption bundle to maximize utility, subject to a budget constraint. Choice of the consumption bundle incorporates decisions on ‘quantity’ of attendance at sporting events over some specified time period as well as on all other goods and services. Existence of a budget constraint introduces a fundamental trade-off for consumers—that the opportunity cost of consuming more of one good or service is the reduction in the amounts of other goods and services that can be consumed.

Application of the consumer-theory model suggests five main categories of determinants of demand for attendance at sporting events: (i) form of consumer preferences—habit; age of club; (ii) economic: price—travel costs; income; market size (including demographic composition of population); availability of substitutes (TV; other sporting events); macro-economic factors (rate of unemployment); (iii) quality of viewing—quality of seating and stadium; stadium size; timing of contest; (iv) characteristics of the sporting contest—uncertainty of outcome; ‘success’ of competing teams; quality of contest; significance of contest; and (v) supply capacity.

In the rest of this section, each of these categories of determinants of demand is discussed in more detail.

### **(ii) Consumer Preferences**

The form of consumer preferences is fundamental to the nature of demand for attendance at sporting competitions. In some respects consumer preferences about sporting contests are likely to share standard properties with preferences for other types of goods and services. For example, utility will be increasing with the quality-adjusted quantity consumed. In this context, the measure of quality-adjusted consumption might be the sum of the interaction of matches attended and whether the team supported won or lost that match. But it also seems that there is a greater degree of complexity about preferences for attendance at a sporting contest than for most other goods or services. (Perhaps, though, this is always how it seems when you think in detail about a particular market!) For example, motivations for attendance at sporting events arguably encompass effects of ‘habit’ (team loyalty); ‘conspicuous consumption’ (for example, being able to have preferred seating, such as in ‘super-boxes’); and ‘bandwagon’ effects (whereby

attendance by one fan increases the ‘value’ of attendance for other fans).

### **(iii) Economic**

A standard set of economic factors would be expected to affect demand for attendance. Price of admission and, more generally, the opportunity cost of attendance (including for example, cost of travel, car parking, food and beverages at the venue, and match programme), would be predicted to be negatively related to attendance. Income of fans or of the population that is the potential audience at a sporting contest (assuming attendance is a normal good), and size of population in the potential market for a contest, would be expected to be related positively to attendance. Availability and price of substitutes would also be expected to influence attendance. Some substitutes might be considered ‘direct’, such as watching the same contest on delay, or live on free-to-air or pay-TV. Other substitutes will be ‘indirect’, for example, attending a different sporting event or contest; or other types of entertainment alternatives such as theatre or movies. Macroeconomic factors such as the rate of unemployment may also have an impact on attendance. It has, for example, been suggested that attendance at sporting events may constitute a social outlet for unemployed persons, so that (other things equal) attendance is higher as the rate of unemployment increases. In their history of Australian Rules football, Sandercock and Turner (1981, p. 91) describe an audience for ‘many of whom football may have been the main escape from the unfair play of the capitalist system’. Other macroeconomic-type factors that might affect attendance are GDP and working hours.

### **(iv) Quality of Viewing**

One aspect of quality of viewing at a sporting event is the facilities at the stadium where the contest takes place, including, for example, the quality of seating; the impact of adverse weather conditions; distance from contest and extent of vision to different parts of the sporting field of different types of seating; food outlets; and bathroom facilities. Another aspect is timing of the contest—the day of week on which the contest takes place, whether the contest is on a public holiday, and the time of day.

**(v) Sporting Contest**

To describe the effect of characteristics of a sporting contest on demand for attendance, we consider an example of a sporting league with  $n$  teams. Suppose at some stage during a season the rank-order of teams based on performance is  $\{T_1, T_2, T_3, \dots, T_n\}$ , where  $T_i$  = identity of  $i$ th ranked team. Then for a contest between any two teams:

- (i) success of competing teams in the match can be measured by rank-order of each team (for example,  $T_i, T_j$ );
- (ii) quality of a match can be represented by the average rank-order of competing teams  $((T_i + T_j)/2)$ ;
- (iii) uncertainty of outcome could be measured by the difference in rank-order of competing teams  $(T_i - T_j)$ ; and
- (iv) significance of the contest can be represented by whether either team is in a segment of rank order where promotion/relegation/play-off participation is feasible (for example,  $\max \{T_i, T_j\} > x$ , where  $x$  = threshold rank for team to be in play-offs).

It is plausible that each of these characteristics of a contest may be associated with fan interest in, and hence demand for attendance at, a sporting contest. Fans of a particular team are likely to prefer watching their team in a contest it will win, and team success is one possible proxy for the likelihood of winning. Other types of fans, with less attachment to a team (or perhaps even, to some extent, fans with strong attachment), may have a higher level of interest in an ‘even’ contest—and the difference in historical performance of teams in a match will proxy for that uncertainty. Fans are also likely to be attracted to contests with high-quality displays of skills, and average quality of teams meeting in a contest is one way to represent the quality effect. Of course, while at a particular point in time, quality of contest may be related to rank-order position of teams involved, over time the quality of contest may vary independently of rank order—for example, a match between the two highest-ranked teams may involve higher-level displays of physical skills in

2000 than in 1950. Finally, fan interest is likely to be higher where a contest has greater significance in terms of the league-standing effect.

These descriptions of measures of each characteristic of a contest are intended to be illustrative. First, it is important to note that there are other ways of measuring each characteristic. For example, an alternative way of measuring the likelihood of team success or the predicted evenness of a contest may be to use betting odds. Second, there are other dimensions to characteristics such as uncertainty of outcome. Using the reference point of a particular contest, the natural measure of uncertainty of outcome is with regard to that contest. However, it is generally also considered that fan interest in a sporting competition will be sensitive to medium- and longer-run dimensions of uncertainty of outcome. One dimension is intra-seasonal uncertainty. For example, at any point during a season, a greater degree of evenness in team winning percentages will mean a larger number of teams are in contention for the play-offs. Therefore, to the extent that each fan’s interest depends on the possibility of their team winning that season’s championship, this will mean a higher overall level of interest in the competition. The other dimension is inter-seasonal uncertainty of outcome. This tends to be associated empirically with the extent of turnover in the identity of teams that win premierships or participate in play-offs across seasons. The rationale for thinking that long-run uncertainty will matter for fan interest is expressed as follows by Leifer (2000, p. 11):

Competitive balance yields winners and losers in both games and seasons, but it keeps open the chance that winners will lose and losers will win in subsequent competition. This helps undermine the significance of past winning and losing by arousing public interest in upcoming competition, no matter what has happened in the past.

It is also important to be aware that the different characteristics of the contest are not independent. One example is a potential trade-off between team success and uncertainty of outcome (for example, Szymanski, 2001). Each fan may prefer their own team to be as successful as possible, by winning all matches or a series of premierships; but if this occurs for a team then it will reduce the level of competitive balance in the sporting competition.

### (vi) Supply Capacity

Consumption of a sporting contest must take place at a particular time and day. The supply capacity for that contest will be determined by size of the stadium at which the contest takes place. Where ‘desired’ attendance is less than stadium capacity, there is no constraint on attendance from supply capacity, and attendance will equal ‘desired’ attendance. But where ‘desired’ attendance is more than stadium capacity, then rationing will occur, and attendance will be equal to stadium capacity and less than ‘desired’ attendance.

## V. DETERMINANTS OF ATTENDANCE—EMPIRICAL EVIDENCE

This section reviews empirical evidence on the main determinants of match attendance. The first sub-section provides a general overview on topics and methods used in the studies reviewed. The second sub-section discusses a range of econometric issues that arise in estimation of determinants of attendance. Subsequent sub-sections review evidence on the key determinants of attendance.

The scope of the review in this section is largely confined to economics-oriented articles that tend to examine determinants of attendance using aggregate data on match- or season-level attendance, and use regression methodologies. It is worth noting briefly that sports marketing scholars have adopted alternative methodologies to examine the determinants of demand for sport. Survey data are commonly used to rate variables including sports fan motivation (Wann *et al.*, 1999) or psychological commitment to a sports team (Mahoney *et al.*, 2000; Funk and James, 2001). Familiar issues such as uncertainty of outcome have also been examined via the survey method. For example, Gan *et al.* (1997) found the enjoyment levels of males watching National Collegiate Athletic Association (NCAA) basketball to be a monotonic function of the degree of uncertainty of outcome. Interested readers should refer to Van Leeuwen *et al.* (2002) and the literature relating to sports fan typologies (see section II) for an introduction to the sports marketing literature on the determinants of direct demand for sporting contests.

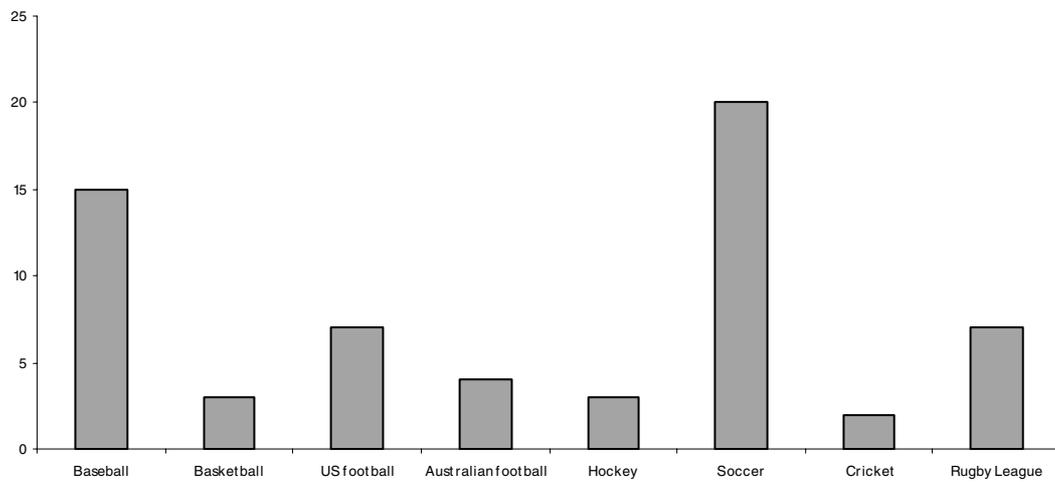
### (i) Overview

In seeking to interpret and draw general lessons from the empirical econometrics literature on demand for attendance it is, of course, necessary to keep in mind ‘where the literature has come from’. Summary information on studies of demand for attendance is presented in Figures 1–3. Three main points about the nature of research are evident. First, research on demand has primarily been undertaken on baseball and soccer. Second, the overwhelming majority of studies are for competitions in the USA and the UK. Third, most studies are cross-sectional—that is, examining the determinants of attendance at individual matches within a season; there have been relatively few time-series or panel studies with long time spans.

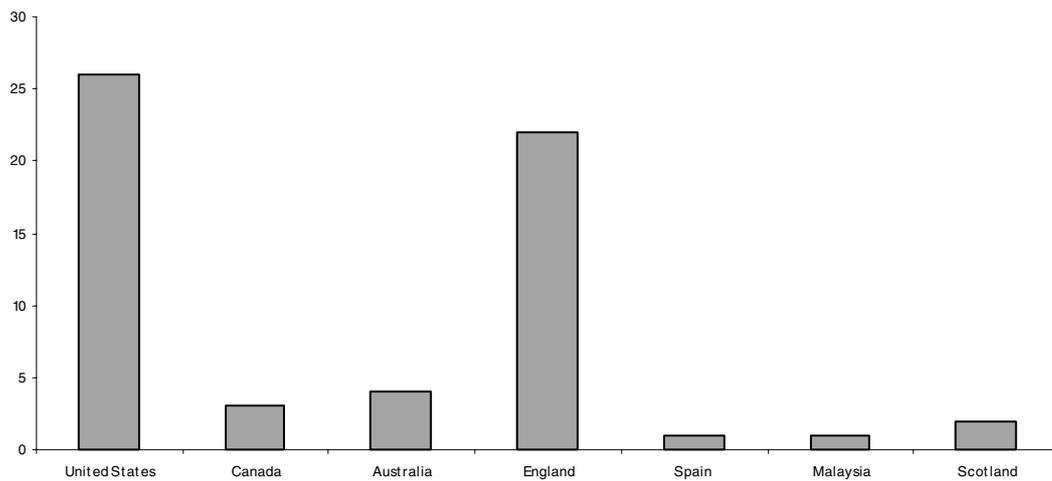
Specific details of studies of determinants of attendance are listed in Appendix Table A1. From this information it is possible to develop a perspective on the evolution of studies of demand. Several generations of empirical studies can be identified since the initial research in the mid-1970s by Noll (1974) and Hart *et al.* (1975). The first generation of empirical research mainly consisted of cross-sectional or time-series studies of determinants of attendance. Explanatory variables for attendance were primarily ‘economic’ (for example, price and income), but with an emphasis as well on uncertainty of outcome. In these studies there was little attention to issues of econometric methodology. The second generation involved an increasing use of panel-type data—most commonly average attendance by team for multiple teams over multiple years. A wider range of explanatory variables was introduced (for example, match quality, weather, age of team). The third generation of studies has brought a greater focus on econometric issues (for example, causality), and a more sophisticated analysis of the relation between explanatory variables and attendance (for example, testing for team-specific heterogeneity in effects of variables such as price).

This brief review suggests two main principles for application of findings from existing literature on determinants of attendance. First, the fairly narrow basis of the literature suggests that caution is necessary in extrapolating beyond baseball and soccer and outside the UK and the USA. Second, the evolution of methodology—with the general

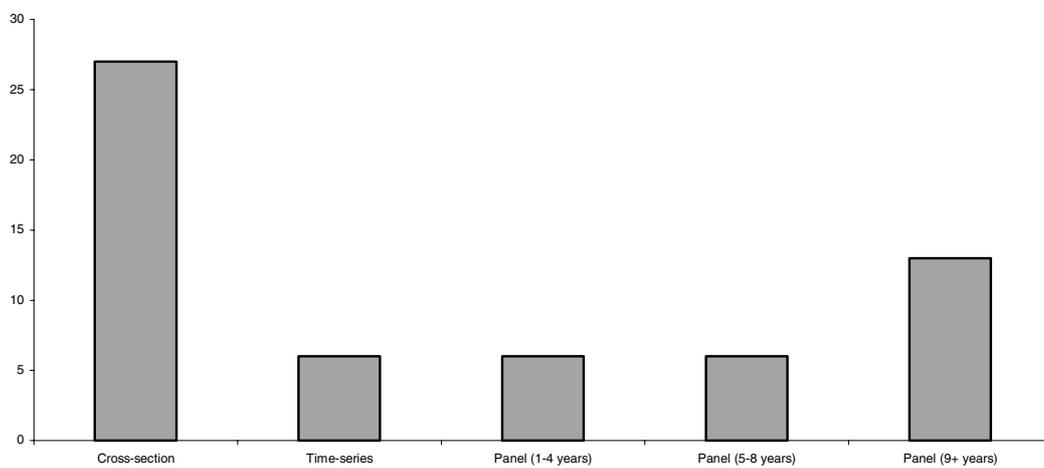
**Figure 1**  
**Studies of Attendance at Sporting Leagues, by Sport**



**Figure 2**  
**Studies of Attendance at Sporting Leagues, by Country**



**Figure 3**  
**Attendance at Sporting Competitions, by Type of Empirical Analysis**



tendency being towards use of more robust empirical approaches—means that individual studies probably need to be accorded different weights in forming overall judgements about determinants of attendance.

## (ii) Econometric Issues

What are the main econometric methodology issues that may need to be dealt with in a study of determinants of attendance, and hence are important for deciding how much ‘weight’ to attach to a particular study?

One set of issues is with regard to attendance. First, there is the relation between attendance and stadium size. In some situations stadium size may act as a constraint on attendance, so that empirical modelling of attendance would need to take into account that it is ‘truncated’. There may also be a problem of joint endogeneity between attendance and stadium size—specifically, potential spectators may base decisions on whether to attend on the likely availability of a seat/ticket at a match in a way that depends on stadium size. Second, there is a variety of types of attendance—for example, distinctions exist between standing and seated admission, and between paying on a per-match or season-ticket basis. Any empirical study needs to make decisions such as whether to aggregate or model separately these types of attendance.

A second set of issues relates to price. One question is about how to measure price. Measurement of price has several dimensions. First, should the price measure be admission price or some estimate of opportunity cost of attendance (incorporating, for example, travel costs)? Second, where there are alternative admission-price systems—such as season-ticket and per-match price—how should admission price be represented? A second question is about potential endogeneity between price and attendance—for example, there is the possibility that profit-maximizing teams in locations with higher population sizes will set higher prices. Such a problem would generally need to be addressed using a method such as instrumental variables (that is, finding a variable that explains price variation, but is not a significant explanatory factor for attendance—see Kennedy, 1998, pp. 139–40).

A range of problems may arise with respect to other explanatory variables for attendance. One potential problem is omitted variable bias. Possible examples in studies of determinants of attendance are positive correlation between income per capita and population by region; and correlation between income per capita and the rate of unemployment. In either example, coefficient estimates will be affected by whether one or both variables are included as explanatory variables for attendance. A second issue is with regard to developing appropriate quantitative representations of potential determinants of demand. For example, it is easy to accept that some dimension(s) of uncertainty of outcome and quality of contest will affect attendance—but, given the complex nature of these variables, it is a difficult exercise to develop a comprehensive empirical representation (see for example, Zimbalist, 2002; Fort and Maxcy, 2003).

Representing consumer preferences is another substantive issue in estimating the determinants of attendance. There is a diverse range of motivations for attendance at sporting events, and incorporating these influences into empirical analysis of demand is important—both for understanding about the role of each influence, and because failure to take account of the factors may cause estimation problems. For example, failure to take account of the effect of habit on attendance may cause problems of autocorrelation.

## (iii) Uncertainty of Outcome and Team Success

Team success and uncertainty of outcome are related concepts—since uncertainty of outcome of a match is likely to depend on some measure of the relative historical success of teams in that match—and hence these concepts are examined together.

### *Team success*

Most studies of the determinants of match attendance use some type of historical measures of team performance as explanatory variables. Standard measures used are winning percentage during the current season, league rank in the current season, or a measure of performance over recent seasons. A strong and consistent finding from these studies is that home-team performance (current and lagged) has a positive effect on attendance. There is,

however, mixed evidence on the effect of away-team performance—in about half the studies reviewed there is no significant effect, and in the other half there is a significant positive effect. It is important to note that the findings on team success are from studies for a range of sports and across a variety of countries—for example, Major League Baseball (Kahane and Shmanske, 1997); English soccer (Forrest and Simmons, 2002); and American football (Noll, 1974). One interesting extension has been to examine the sensitivity to team performance of demand for standing admission and seated admission—Dobson and Goddard (1992) find that for attendance at English soccer matches in 1989–91 demand for seating is less sensitive to current performance than demand for standing room; but that the reverse holds for previous performance. This may reflect that seating admission consists disproportionately of season ticket holders. Another important point that has not received much attention is the possibility of reverse causality between attendance and team success—using data on attendance at English rugby league matches, Davies *et al.* (1995) find stronger evidence of causality from attendance to team performance than in the other direction.

#### *Uncertainty of outcome—match*

Evidence of an effect of match-level uncertainty of outcome on match attendance is relatively weak. Two main approaches to representing match-level uncertainty of outcome have been used—first, some measure of difference in winning percentage or league ranking of teams; or, second, a measure of the probability that a team will win derived from betting odds (or a handicap measure based on relative odds for both teams). Of 18 studies identified (see Appendix Table A2), only about three provide strong evidence of an effect on attendance (see, for example, English rugby league—Peel and Thomas, 1997). Other studies provide mixed evidence that suggests a negative affect on attendance of increasing home-team win probability only when that win probability is above about two-thirds. The majority of studies find either that there is no significant relation between difference in team performance and attendance (for example, Baimbridge *et al.*, 1996), or more directly contradictory, that attendance is monotonically increasing with the probability of a home-team win (for example, Forrest and Simmons, 2002).

#### *Uncertainty of outcome—seasonal*

There is much stronger evidence of an effect of season-level uncertainty on attendance. One type of evidence is ‘indirect’, from studies that examine the relation between the ‘significance’ of a match and attendance. A variety of studies find, for example, that where a match is significant for determining promotion or relegation, or for participation in play-offs, then attendance is higher (for example, Jennett, 1984; Burkitt and Cameron, 1992; Dobson and Goddard, 1992). This implies that where there is a greater degree of evenness in a sporting competition within a season, and hence a greater share of matches that will be ‘significant’, the higher will be attendance. A second type of study examines the relation between total season attendance and average games behind the leading team for teams during a season (for example, Major League Baseball—Hunt and Lewis, 1976), or between match attendance and average games behind the leading team of teams contesting a match (for example, American football—Noll, 1974). A relatively consistent finding from these studies is that higher intra-season unevenness—with dispersion being represented by games behind leader—in a competition will lower attendance. A third approach is the ‘natural experiment’ study of attendance at League and FA Cup soccer matches in the UK by Szymanski (2001). This approach compares attendance at matches played between the same teams in the League Championship (more even competition) and the FA Championship (less even competition). Consistent with a predicted positive effect of intra-seasonal uncertainty of outcome on attendance, it is found that, on average, attendance is higher at League Championship matches.

#### *Uncertainty of outcome—long-run*

A small group of studies has addressed the question of whether ‘turnover’ in team performance across time matters for attendance. Some recent studies of attendance at Major League Baseball (Schmidt and Berri, 2001; Humphreys, 2002) find considerable support for a positive relation between long-run competitive balance and uncertainty of outcome. The Humphreys study is notable for introducing a new measure of average variation in team performance across 5-year intervals, and demonstrating that this measure has greater explanatory power for total annual attendance than alternative measures, such as a Herfindahl index for concentration of

winning percentage. Earlier studies, however, found less support for a relation between long-run uncertainty and attendance; for example, Borland (1987) fails to find a relation between annual attendance at Australian Rules football matches and a measure of the number of different teams competing in play-offs in the previous 3 years.

### *Conclusion*

Recently there has been some controversy about the relevance of competitive balance. While one body of opinion has competitive balance as the ‘gold standard’ to which all sporting competitions should aspire (see for example, Levin *et al.*, 2000), Zimbalist (2002) is representative of a contrary school of thought:

The need for competitive balance has been used as an all-purpose justification for competitive restraints in anti-trust cases in the USA and Europe. Given the apparent ambiguities in identifying the nature and scope of the problem, there is good reason for this justification to receive close scrutiny in the future;

and Szymanski (2002) argues:

Given that even supportive studies on the issue of match uncertainty seem to imply that attendance is maximized when the home team is twice as likely to win as the visiting team, the empirical evidence in this area seems far from unambiguous.

The review in this article suggests that a more subtle interpretation is possible. First, there is, indeed, reason to question the idea of relation between match-level competitive balance and attendance. There is overwhelming evidence that attendance is related positively to home-team (and in some studies away-team) performance, and there is little evidence to support the idea that attendance is higher when a ‘close’ contest is expected. Second, ruling out a relation between match-level uncertainty and attendance is not to rule out altogether an effect of uncertainty of outcome on attendance. This is because the evidence also suggests that there is quite strong support in existing studies for the existence of a relation between attendance and season-level competitive balance—both within a season, and across seasons.

### **(iv) The Effects of TV**

There is not strong evidence on how TV broadcasts affect attendance. In part, this is because there are

relatively few studies; but, as well, it can be attributed to the difficulties in undertaking empirical analysis on effects of TV. One problem is potential joint endogeneity. For example, both TV broadcasts and match attendance may be explained by home-team quality. Where analysis of determinants of attendance does not perfectly control for home-team quality, then this would impart an upward bias to estimates of the effect of TV on attendance. Another problem is to develop an appropriate measure of TV broadcasts. In order to capture the way that availability of TV broadcasts affects attendance, it is necessary to have a relatively rich representation of TV—incorporating aspects such as whether the broadcast is live, the time delay for delayed broadcasts, and total number of matches shown or duration of broadcasts. As well, the effect of availability of TV broadcasts may vary depending on factors such as weather.

The majority of econometric evidence on the effect of TV is from a series of studies of effects of live TV broadcasts on match attendance. Consistent findings come from a group of studies of effects of BSkyB broadcasts on attendance at soccer and rugby league matches in England in the mid-1990s (Baimbridge *et al.*, 1995, 1996; Carmichael *et al.*, 1999) and of live broadcasts of Spanish soccer (Garcia and Rodriguez, 2002). The English studies find that live broadcasts have either a significant negative or zero effect—depending on the timing of the match. (Specifically, negative effects appear to occur on week-nights, whereas zero effects occur on weekends.) The Spanish study also finds a significant negative effect on attendance—regardless of whether the match was broadcast on public or private TV. Other studies of the effects of live broadcasts have, however, found an opposite result. A study of attendance at Major League Baseball in 1993 (Bruggink and Eaton, 1996) finds positive effects of live broadcasts by a local station in the National League, but negative effects in the American League; and live broadcasts by national TV stations are not found to affect attendance. A study of college football attendance (Price and Sen, 2003) also finds a positive relation with live broadcasts.

Studies of college football attendance in the USA in the 1970s and 1980s find some evidence of positive effects of telecasts per team per year and an historical measure of average telecasts per team

(Kaempfer and Pacey, 1986; Fizel and Bennett, 1989). These studies, however, seem particularly likely to be affected by the problem of joint endogeneity owing to the type of measure of TV broadcasts used and since an extensive set of controls for team quality are not included. Other studies provide mixed evidence on effects of TV broadcasts—from significant positive to significant negative effects—for example, Borland (1987) on Australian Rules football, and Humphreys (2002) on Major League Baseball. But generally these studies use very broad measures of TV broadcasts, such as hours per week of matches on TV.

In summary, the main available evidence suggests a negative effect of live TV broadcasts on attendance at sporting contests. Nevertheless, on the basis of existing empirical evidence, it is certainly not possible to rule out some positive effects of TV on attendance. One point is that it is necessary to take into account ‘general equilibrium’ effects. Live broadcast of a match may decrease attendance at that match, but nevertheless stimulate interest in the sporting competition in a way that increases total attendance. A second point is that the effects of TV are quite likely to be heterogeneous across time, and between different sports. What is needed to advance knowledge on this question further is extra studies that introduce a more sophisticated set of measures of TV broadcasts, and extend analysis to a wider range of sports.

#### (v) Quality of Viewing

Quality of viewing has been proxied in several studies of match attendance at Major League Baseball using ‘age of stadium’. A strong finding from all those studies is that attendance is inversely related to stadium age. One concern might be that stadium age acts as a proxy for stadium capacity (and hence the estimated effect of stadium age is biased upward). However, recent studies (McDonald and Rascher, 2000; Depken, 2001) include controls for both variables, and still find significant negative effects of stadium age.

Another dimension of quality of viewing is weather conditions. One robust finding from studies of the relation between weather and attendance is that types of weather conditions that are known to

disrupt play in a sporting contest will have a negative effect on attendance. The primary example is cricket, where rain—which stops play—has a strong negative effect on attendance (Schofield, 1983; Hynds and Smith, 1994); but temperature and amount of sunshine are not found to affect attendance. The other main finding is an apparent Atlantic divide in the effect of weather conditions—most British studies seem to find that rain and temperature do not significantly affect attendance at rugby or soccer matches (for example, Bird, 1982; Carmichael *et al.*, 1999); whereas the norm in American studies is to find that adverse weather conditions, such as rain or extreme temperatures, will negatively affect attendance at football and baseball matches (for example, Bruggink and Eaton, 1996; Welki and Zlatoper, 1999; Butler, 2002). (An exception is Garcia and Rodriguez’s (2002) study of attendance at soccer in Spain—which finds a significant positive effect on attendance of absence of rain.) Perhaps some of this apparent Atlantic difference might be explained by the interaction of weather and the type of stadium (for example, different mixes of seating types).

Timing of matches appears to affect attendance in ways that would be expected. From English soccer, rugby league, and cricket there is evidence that attendance is higher when a match is played on a public holiday (Schofield, 1983; Baimbridge *et al.*, 1996; Carmichael *et al.*, 1999). Findings from Australian Rules football indicate that attendance is higher when a given set of matches is spread across a longer time period (Drever and McDonald, 1981; Borland and Lye, 1992). And findings from Major League Baseball in the USA and cricket in England suggest that attendance is higher on weekends (Schofield, 1983; Knowles *et al.*, 1992).

Finally, some studies have examined the effect of ‘promotions’ on attendance at individual matches. Promotions such as ‘bat days’ in Major League Baseball, and ‘homecoming day’ in college football, are found to be significantly positively related to attendance (for example, Bruggink and Eaton, 1996; Wells *et al.*, 2000). However, it must be noted that—to the extent that promotions cause substitution in attendance between matches—there may be an effect on attendance at individual matches, but no effect on, for example, seasonal attendance.

### (vi) Contest Quality

A range of evidence from studies of determinants of attendance can be used to assess the effect of 'contest quality' on match attendance. One type of evidence is with regard to competition structure. Studies of sporting competitions—primarily soccer in England—that have different divisions uniformly find that matches between lower-division teams have lower attendance (for example, Walker, 1986; Jones *et al.*, 2000; Wilson and Sim, 1995). Second, there is mixed evidence on the effect of star players on attendance—some studies find a positive effect, but a slight majority of studies find no significant effect (for example, Schofield, 1983; Kahn and Sherer, 1988; Hausman and Leonard, 1997). Third, there is, of course, the finding that attendance is positively related to team success—however, such a finding is likely to confound effects of probability of winning and contest quality. Of greater relevance is a small group of studies that finds that average league standing or performance of teams in a match have a significant positive effect on attendance (for example, Borland and Lye, 1992).

### (vii) Do Price and Substitutes Affect Attendance?

There is strong evidence that admission price has a negative effect on attendance. Of the studies identified in Appendix Table 1, about 20 provide evidence of a significant negative relation between admission price and attendance, and only three suggest a significant positive relation. The studies that find significant negative effects span the range of sports and countries covered by existing research—for example, soccer throughout Europe (Simmons, 1996; Garcia and Rodriguez, 2002), Australian Rules football (Borland, 1987), and Major League Baseball (Whitney, 1988). While some early studies can be subjected to the criticism of failing to take into account the possibility of econometric problems, more recent studies have, for example, sought to justify exogeneity of the price effect on attendance on the basis of institutional features of price-setting (for example, Borland, 1987); or used econometric methodology that takes account of the time-series properties of data (for example, Simmons, 1996).

Recent studies have undertaken more sophisticated analyses of price effects by considering how price

elasticity varies across time, and between teams. For example, in English soccer it appears that considerable inter-team heterogeneity exists in the elasticity of attendance with respect to admission price. Using data on average annual attendance between 1962 and 1991, Simmons (1996) estimates a price elasticity of  $-0.12$  for Manchester United and  $-1.21$  for Aston Villa. Dobson and Goddard (1995, 1996) find similar evidence of heterogeneity, and seek to test for the determinants of inter-team price-elasticity differences. One important influence appears to be the number of substitute teams in the same geographic region.

An important component of the opportunity cost of attending a sporting contest is likely to be transport costs. Most evidence on the effect of transport costs is from English soccer and rugby league. Many studies find that match attendance is decreasing with distance between home locations of the two teams playing—although more recent research suggests that the marginal negative effect of distance declines with total distance between the home locations (see for example, Baimbridge *et al.*, 1996; Baimbridge, 1997; Carmichael *et al.*, 1999). Other studies of soccer in France (Falter and Perignon, 2000) and Spain (Garcia and Rodriguez, 2002) confirm the finding of a negative effect of transport costs. Notably the former study includes a direct measure of transport costs—the cost of a return economy train fare between the home locations. Of course, these findings must be seen as specific to sporting competitions—such as in Europe—where it is possible for a large number of fans of the 'away' team to travel to the match location. It is also necessary to take into account that the distance effect may to some degree be acting as an inverse proxy for a 'local derby' effect—such an effect would bias downward the estimated effect of distance on attendance. Nevertheless, it seems reasonable to conclude that there is fairly strong evidence that transport costs—both cost of transport and opportunity cost of travelling time—matter to fans.

Some studies on English soccer have sought to combine admission price and transport costs in order to estimate an effect of the opportunity cost of attendance on demand. The most sophisticated study for the English Premier League in 1995/6—by Forrest *et al.* (2002)—includes admission price, a weighted average of transport costs, and

a behavioural cost of time. Significant negative ‘generalized cost’ elasticities are found for attendance at matches of all Premier League teams. It is emphasized that the elasticity with respect to opportunity cost is higher than in earlier studies that had used only admission price measures.

Only limited evidence on the effects of substitutes is available. Studies on basketball (Brown *et al.*, 1991), Major League Baseball (Pan *et al.*, 1999), and test-match cricket (Hynds and Smith, 1994) find that availability of other sporting competitions reduces attendance. For example, it is found that test-match cricket attendance is lower when the All England Tennis Championship at Wimbledon is being played. By contrast, Swan (1997) develops simple estimates of the cross-elasticity of demand for attendance at Australian Football League, Australian Rugby League, and Australian Rugby Union matches played in Sydney and Brisbane between 1992 and 1994, and concludes there is no effective substitution of attendance between the three competitions.

#### (viii) Consumer Preferences

Many studies find evidence that habit is an important determinant of demand. Most usually, this is from time-series or panel-data studies that include a lagged attendance measure as an explanatory variable, and interpret it to represent the effect of habit. Issues associated with conspicuous consumption and bandwagon effects do not appear to have received attention. One issue that has been considered in some studies is whether customer preferences vary with the racial composition of teams. Some early studies found evidence that attendance at National Basketball Association basketball matches was greater where there was a higher proportion of white players (for example, Kahn and Sherer, 1988; Brown *et al.*, 1991). However, Kahn (2000, p. 85) suggests that ‘by the 1990s, customer preferences for white players were less evident’. Moreover, there is no evidence of fan discrimination from attendance studies for other sports, such as baseball or American football.

## VI. DERIVED DEMANDS

There are many sources of derived demand for sport. Other articles in this issue specifically con-

sider the economic and policy issues relating to broadcasting (Tom Hoehn and David Lancefield), gambling (David Forrest and Robert Simmons), and government subsidies for sports teams and facilities (Robert Baade). In light of these contributions, it is sufficient here to outline the relationship between sport and derived demand and highlight some key trends and common policy issues with respect to two key sources of derived demand—broadcasters and corporate sponsors.

It is difficult to generalize across all categories, but derived demand for sport can usefully be thought of as being dependent on two factors: (i) the ability of a sport to provide a producer of consumer products with cost-effective access to profitable target markets and, consequently, (ii) the popularity of the sport or sporting competition itself. Those organizations with a derived demand for sport use the sporting product as an intermediary in the distribution and/or promotion of their own consumer products—whether entertainment, news, clothing and footwear, alcohol, gambling products, or fantasy sports competitions. Owners of the sports ‘properties’, including sporting clubs, leagues, and national and international regulatory bodies, similarly require the involvement of stadiums, broadcasters, and the print media to supply the sporting product to sports fans. This creates a nexus between the owners of sports ‘properties’ and those organizations with a derived demand for sport.

This nexus is particularly clear in the relationship between broadcasters and sport. Broadcaster demands for control of the sporting product have already seen changes to the rules and scheduling of most televised sports. Perrine (2002), for example, suggests that examples such as World Series Cricket, Super League (rugby league), and the XFL (American football) point to a future of vertically integrated ‘media leagues’. Bidding wars have seen dramatic escalation in the value of free-to-air and pay-TV broadcast rights around the world. Unsuccessful bidders and those broadcasters seeking more cost-effective programming have an incentive to create a media league as a rival to traditional sporting competitions. However, media leagues can have severe negative consequences for a sport. For example, the ‘Super League war’ began when News Limited (the Australian subsidiary of Rupert Murdoch’s News Corporation) was unable

to acquire the broadcast rights to the Australian Rugby League in the mid-1990s (at the time the elite rugby league competition in Australasia). Average annual match attendances between 1996 and 1998 fell by 20 percent in comparison to pre- and post-Super League levels (Macdonald, 2003). The ARL has been replaced by the National Rugby League, which is 50 per cent owned by News Limited. Ongoing uncertainty regarding the future of elite-level European soccer competitions and Formula One motor racing may provide future opportunities for broadcasters to create rival leagues in direct competition with traditional sporting competitions for athletes and supporters.

Three elements of the demand of prospective sports sponsors are noteworthy. First, one of the traditional drivers of sports sponsorship has been the personal sporting interests of the managers/owners of the organization seeking to engage in sports sponsorship. Second, commercial market-research methodologies suggest sponsors pay attention to indicators such as attendance, television ratings and time-slots, and general media attention when assessing prospective sponsorship alternatives (Farrelly and Quester, 2003; Sweeney Sports Research Consultants, 2003). Finally, marketing research highlights the complexity of the relationship between sponsors, owners of sports organizations, and sports fans/consumers. For example, Farrelly and Quester (2003) identify the importance of trust, commitment, and market orientation in the relationship between sponsors and the Australian Football League clubs, while Tripodi (2001) explains the psychological processes involved in the transfer of individual loyalty from sports teams to corporate sponsors.

Use of intellectual property is an issue of equal importance to broadcasters, sponsors, and the owners of sports properties alike. In the context of sport, intellectual property includes trademarks, such as club names, logos and playing strips, and league/competition names and logos, as well as copyright material including all audiovisual recordings of sporting contests. Use of such intellectual property by sports organizations, broadcasters, or sponsors necessarily includes use of the name, image, and likeness of individual athletes. Who owns the right commercially to exploit such individual personality attributes? In Australia and the UK celebrities (i.e. athletes) do

not 'own their personality' as they do in the USA, where common law and legislation both recognize the personality rights of an individual (Weathered, 2000). Irrespective of the law, sports organizations are recognizing the importance of including terms in employment contracts and collective-bargaining agreements to regulate the use of personality attributes by broadcasters, sponsors, and merchandisers and to ensure that athletes are compensated for the exploitation of such personality attributes (Macdonald and Tripodi, 1999; Smith and Bennett, 2002).

## VII. SUMMARY

Along with many other areas of the sports economics literature, the past decade has seen an explosion of studies of determinants of demand for sporting contests. Undoubtedly, this growth has significantly advanced knowledge on demand for such contests. But it is probably useful to begin this summary by reiterating two cautionary notes. First, there is much still to be learned. The literature has focused largely on the UK and USA, and on sports such as soccer and baseball. For that reason, the 'generality' of findings from demand studies must be regarded as somewhat questionable. Second, one important lesson is that there are no simple lessons. This is evident from studies of determinants of demand for attendance. In that literature it has been shown that a sophisticated treatment of factors such as uncertainty of outcome, TV broadcasts, and price is necessary to assess rigorously their effects on demand.

At the same time, some more positive general lessons do seem to emerge from empirical studies of demand for attendance, which have been the primary focus of this review. One lesson is that uncertainty of outcome—but only intra-seasonal or inter-seasonal—does seem to affect demand. This suggests that sporting-league administrators may have a basis for imposing rules and regulations that seek to achieve competitive balance. However, those regulations can only be justified on a public-benefit basis where they can be demonstrated to address issues of longer-term competitive balance. A second lesson is that higher contest quality is associated with higher attendance. This suggests

that an important trade-off in expansion of a sporting league is the reduced average quality of player ability that will thereby result. The finding that attendance is lower in lower divisions of competitions, such as English soccer, is also consistent with suggestions that promotion–relegation systems may enhance team performance incentives. (In fact, this seems a necessary but not sufficient condition—what is required is that attendance is lower for a match between two teams in a lower division than it would be were the same two teams to be in the bottom section of league rankings in a competition

with all teams in one league.) A third (strong) lesson is that quality of viewing does matter for sporting fans. Attendance is higher at newer stadiums, and is responsive to weather conditions and match timing. The fourth lesson is that attendance is price-sensitive, but that the degree of sensitivity differs between teams. It also seems that transport costs have a relatively strong effect on attendance. Finally, there is mixed evidence on the effect of TV broadcasts on attendance. This is an example of where a more sophisticated treatment is necessary properly to draw out the effect on attendance.

## APPENDIX

**Table A1**  
**Econometric Studies of Determinants of Attendance at Sporting Leagues**

Study	Sport	Country	Type of study
Noll (1974)	(a) Baseball (b) Basketball (c) Football (d) Hockey	USA: (a) Major League; (b) NBL; (c) NFL; (d) (also Canada) NHL	(a) Panel; attendance per season by home team; 23 teams; 2 years (1970–71). (b) Panel; average attendance per game by season by home team; 2 years (1969/70–1970/1). (c) Cross-section (1968, 1970); total attendance by home team. (d) Cross-section (1972/3); average attendance per match
Hart <i>et al.</i> (1975)	Soccer	England: First Division	Panel; attendance per match by home team; four teams; three seasons (1969/70–1971/2)
Hunt and Lewis (1976)	Baseball	USA: Major League Baseball	Panel; attendance per match by home team; five seasons (1969–73)
Drever and McDonald (1981)	Australian football	Australia: SANFL	Time-series; attendance by match (1974–8)
Bird (1982)	Soccer	England: English Football League	Time-series; total attendance per season; 32 seasons (1948/9–1979/80)
Schofield (1983)	Cricket	England: county one-day competition	Cross-section (1996 and 1997); attendance per match
Jennett (1984)	Soccer	Scotland: Scottish Football League	Panel; attendance per match; six seasons (1975/6–1980/1)

**Table A1 (continued)**

Study	Sport	Country	Type of study
Kaempfer and Pacey (1986)	American football	USA: College Division I	Panel; annual average attendance per match as percent of stadium capacity; 72 teams; six seasons (1975–81)
Walker (1986)	Soccer	England: English Football League	Cross-section (1975/6); attendance per match; 183 matches
Borland (1987)	Australian football	Australia: VFL	Time-series; average attendance per match by season; 37 seasons (1950–86)
Jones and Ferguson (1988)	Hockey	Canada/USA: National Hockey League	Cross-section (1977/8); attendance per match; 632 matches
Peel and Thomas (1988)	Soccer	England: English Football League	Cross-section (1981/2); attendance per match
Whitney (1988)	Baseball	USA: Major Leagues	Panel; total attendance p.a. by team/season; 24 teams; 14 seasons (1970–84, excluding 1981)
Fizel and Bennett (1989)	American football	USA: College Division I	Panel; annual average attendance per match as percent of stadium capacity; 93 teams; six seasons (1980–6)
Brown <i>et al.</i> (1991)	Basketball	USA: NBA	Cross-section (1983–4); attendance per match
Burdekin and Idson (1991)	Basketball	USA: NBA	Panel; average annual attendance by team by season; six seasons (1980/1–1985/6)
Borland and Lye (1992)	Australian football	Australia: VFL	Panel; attendance per match; 132 matches; six seasons (1981–6)
Burkitt and Cameron (1992)	Rugby League	England: British Rugby League	Panel; average attendance per match by team by season; 30 teams; 25 seasons (1966–90)
Dobson and Goddard (1992)	Soccer	England: English Football League, Divisions 1–4	Panel (1989/90–1990/1); attendance per match; 795 matches
Knowles <i>et al.</i> (1992)	Baseball	USA: Major League	Cross-section (1988); attendance per match; 861 matches
Peel and Thomas (1992)	Soccer	England: English Football League	Cross-section (1986/87); attendance per match; 1,506 matches
Hynds and Smith (1994)	Cricket	England: Test matches	Time series (1984–92); attendance by day; 54 matches

**Table A1 (continued)**

Study	Sport	Country	Type of study
Alchin and Tranby (1995)	Rugby League	Australia: National Rugby League	Time series (1960–94); average adult attendance per match by season
Baimbridge <i>et al.</i> (1995)	Rugby League	England: British Rugby League	Cross-section (1993/4); Attendance per match; 240 matches
Davies <i>et al.</i> (1995)	Rugby League	England: British Rugby League	Panel; average home game attendance by season; five teams; 30 seasons (1964–93)
Dobson and Goddard (1995)	Soccer	England and Wales: English Football League	Panel; total attendance by team by season; 94 teams; 67 seasons (1925/6–1991/2)
Wilson and Sim (1995)	Soccer	Malaysia: Semi-pro League	Panel; attendance per match; three seasons (1989–91)
Baimbridge <i>et al.</i> (1996)	Soccer	England: Premier League	Cross-section (1993/94); attendance per match; 462 matches
Bruggink and Eaton (1996)	Baseball	USA: Major League Baseball	Cross-section (1993); attendance per match; 2,108 matches
Coffin (1996)	Baseball	USA: Major League Baseball	Panel; total attendance by home team by season; 31 seasons (1962–92)
Dobson and Goddard (1996)	Soccer	England and Wales: English Football League, Divisions 1–4	Panel; average attendance per team by season; 94 teams; 37 seasons (1955/6–1991/2)
Peel and Thomas (1996)	Soccer	Scotland: Scottish First and Second Divisions	Cross-section (1991/2); attendance per match; 791 matches
Simmons (1996)	Soccer	England: English Football League	Panel; average attendance per match by season; 20 teams; 44 seasons (1948–91)
Stewart and Fuller (1996)	Australian Rules Football	Australia: VFL and SAFL	Time-series; average attendance per match per capita; 47 seasons (1948–94)
Cocco and Jones (1997)	Hockey	Canada: National Hockey League	Cross-section (1989/90); attendance per match (280 matches)
Baimbridge (1997)	Soccer	European Championship 1996	Cross-section; total attendance per match; 31 matches
Branvold <i>et al.</i> (1997)	Baseball	USA: Minor Leagues	Cross-section; average attendance per season by home team; 142 teams

**Table A1 (continued)**

Study	Sport	Country	Type of study
Kahane and Shmanske (1997)	Baseball	USA: Major Leagues	Panel; average attendance by season ; 26 teams; three seasons (1990–2)
Peel and Thomas (1997)	Rugby League	England: British Rugby League	Cross-section (1994/5); attendance per match; 393 matches
Szymanski and Smith (1997)	Soccer	England: English Football League	Panel; average annual gate attendance; 48 teams; 16 seasons (1974–89)
Carmichael <i>et al.</i> (1999)	Rugby League	England: British Rugby League	Cross-section (1994/5); attendance per match; 480 matches
Pan <i>et al.</i> (1999)	Baseball	USA: Major Leagues	Panel; average attendance per match by season; 24 teams
Welki and Zlatoper (1999)	Football	USA: NFL	Cross-section (1986 and 1987); attendance as proportion of sold tickets; 392 matches
Depken (2000)	Baseball	USA: Major Leagues	Panel; total attendance by home team by season; 24 teams; seven seasons (1990–6)
Jones <i>et al.</i> (2000)	Rugby League	England: British League	Panel (1982/3–1990/1); average attendance by season; 37 teams; nine seasons
Falter and Perignon (2000)	Soccer	France: Premiere Division	Cross-section (1997/98); attendance per match; 306 matches
McDonald and Rascher (2000)	Baseball	USA: Major Leagues	Cross-section; attendance per match by home team; 1,500 matches
Wells <i>et al.</i> (2000)	Football	USA: College Division II	Cross-section (1998); attendance per match; 457 matches
Szymanski (2001)	Soccer	England: English League and FA Cup	Panel; attendance per match; 16 seasons (1982/3–1997/8); 1,286 matches
Forrest <i>et al.</i> (2002)	Soccer	England: Divisions 1–3	Cross-section (1995/6)
Depken (2001)	Football	USA: NFL	Panel; attendance per match by home team; 34 teams; nine seasons (1990–8)
Schmidt and Berri (2001)	Baseball	USA: Major League Baseball	Panel; average attendance per team by season; two leagues; 98 seasons (1901–98)
Butler (2002)	Baseball	USA: Major League Baseball	Cross-section (1999); attendance by match; 2,428 matches

**Table A1 (continued)**

Study	Sport	Country	Type of study
Garcia and Rodriguez (2002)	Soccer	Spain: First Division League	Panel; tickets sold per match (excluding season tickets); four seasons (1992/3–1995/6)
Humphreys (2002)	Baseball	USA: Major League Baseball	Panel; total attendance by season by league; two leagues; 99 seasons (1900–99)
Forrest and Simmons (2002)	Soccer	England: Premier League	Cross-section (1997/8); attendance per match; 872 matches
Price and Sen (2003)	Football	USA: College Division 1A	Cross-section (1997); Attendance per match; 577 matches

**Table A2**  
**Effects of Uncertainty of Outcome on Attendance—Review of Main Findings**

Study	Sport/country of outcome	Measure of uncertainty	Main findings—effect of greater uncertainty of outcome
<b>A. Match</b>			
Whitney (1988)	Major League Baseball/USA	Probability of home team win (quadratic specification)	Mixed effect—turning point at $\text{prob}(\text{home team win})=0.4-0.6/\text{significant}$
Borland and Lye (1992)	Australian Rules Football/Australia	Absolute difference in league ranking	No significant effect
Knowles <i>et al.</i> (1992)	Major League Baseball/USA	Probability of home team win (quadratic specification)	Mixed effect—turning point at $\text{prob}(\text{home team win})=0.6/\text{significant}$
Peel and Thomas (1992)	Soccer/England	Probability of home team win (quadratic specification)	Negative effect/significant
Hynds and Smith (1994)	Cricket/England	Dummy variable for degree of uncertainty of outcome prior to final day	No significant effect
Wilson and Sim (1995)	Soccer/Malaysia	Absolute difference in league championship points	No significant effect
Baimbridge <i>et al.</i> (1996)	Soccer/England	Absolute difference in league ranking	No significant effect
Peel and Thomas (1996)	Soccer/England	Probability of home team win (quadratic specification)	Mixed effect—turning point at $\text{prob}(\text{home team win})=0.6/\text{significant}$
Peel and Thomas (1997)	Rugby League/England	Handicap match betting odds	Positive effect/significant

**Table A2 (continued)**

Study	Sport/country	Measure of uncertainty	Main findings—effect of greater uncertainty of outcome
Jones and Ferguson (1988)	Hockey/Canada	Dummy variable for absolute difference in league ranking	No significant effect
Carmichael <i>et al.</i> (1999)	Rugby League/England	Handicap match betting odds	Positive effect/significant
Rascher (1999)	Major League Baseball/USA	Probability of home team win (quadratic specification)	Mixed effect—turning point at prob(home team win)=0.7/significant
Welki and Zlatoper (1999)	Football/USA	Relative betting odds	Positive effect/significant
Falter and Perignon (2000)	Soccer/France	Difference in average goals scored	Positive effect/significant
McDonald and Rascher (2000)	Major League Baseball/USA	Probability of home team win (quadratic specification)	Mixed effect—turning point at prob(home team win)=0.6/significant
Forrest and Simmons (2002)	Soccer/England	Estimated ratio of home team win to away team win	Negative effect/significant
Garcia & Rodriguez (2002)	Soccer/Spain	Difference in league ranking (Home team minus away team)	Negative effect/Significant
Price and Sen (2003)	College football/USA	Differences in games won in last 11 matches	No significant effect
<b>B. Seasonal</b>			
Noll (1974)	Major League Baseball/USA	Average games behind leader	Positive effect/marginally significant
Hunt and Lewis (1976)	Major League Baseball/USA	Average games behind leader (at 2 points during season)	Positive effect/significant
Jennett (1984)	Soccer/Scotland	Significance of match for championship and relegation	Positive effect/significant
Borland (1987)	Australian Rules Football/Australia	Average games behind leader (at 4 points during season)	No significant effect
Borland and Lye (1992)	Australian Rules Football	Number of games required to make finals for teams in a match	Positive effect/significant
Dobson & Goddard (1992)	Soccer/England	Significance of match for championship and relegation	Positive effect for home team/no significant effect for away team
Knowles <i>et al.</i> (1992)	Major League Baseball/USA	Games behind leader	Positive effect/significant

**Table A2 (continued)**

Study	Sport/country	Measure of uncertainty	Main findings—effect of greater uncertainty of outcome
Hynds and Smith (1994)	Test cricket/England	Dummy variable for whether series outcome uncertain	Positive effect/marginally significant
Alchin and Tranby (1995)	Rugby League/Australia	Intra-season measures of distribution of wins	No significant effect
Coffin (1996)	Major League Baseball/USA	Games behind leader	Positive effect/significant
Fuller and Stewart (1996)	Australian Rules football/Australia	Coefficient of variation of games won	No significant effect
Baimbridge (1997)	European Cup soccer	Dummy variable for match ‘significance’	Positive effect/significant
Carmichael <i>et al.</i> (1998)	Rugby League/England	Probability of winning division (pre-season betting odds)	Positive effect/significant
Rascher (1999)	Major League Baseball/USA	Significance of match for play-off participation	Not significant
McDonald and Rascher (2000)	Major League Baseball/USA	Games behind leader of teams in match	Not significant
Jones <i>et al.</i> (2000)	Rugby League/England	Significance of match for championship and relegation	Positive effect/significant
Szymanski (2001)	Soccer/England	Relative intra-season uncertainty between championship and FA cup	Positive effect/significant
Butler (2002)	Major League Baseball/USA	Games behind championship leader	Positive effect for home team/no significant effect for away team
Garcia and Rodriguez (2002)	Soccer/Spain	Measure of likelihood of winning championship of teams in match	Positive effect/significant
<b>C. Long-run</b>			
Schmidt and Berri (2001)	Major League Baseball/USA	Gini coefficient on team winning percentage	Negative effect for previous 1 year/positive effect for previous 3 and 5 years
Humphreys (2002)	Major League Baseball/USA	5-year measure of ratio of variation in team winning percentage in a season to variation in team winning percentages across time	Positive effect/significant

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