**SPECTATOR DEMAND FOR THE SPORT OF KINGS**

by

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**Abstract**

We estimate a model capturing influences on attendance in British horseracing. A fixed effects regression is employed in analysing data containing information on attendances at 23,999 race-days (2001-2018). The patterns of demand are similar to those found for other sports, for example, attendance is higher at weekends and in warmer months and is sensitive to the quality of the racing. Further, attendance falls when races have to compete with some televised sport of national significance. Controlling for a large number of characteristics, the pattern of results on year dummies implies considerable decline in public interest in attending race-days over the period. The pronounced negative trend in attendance suggests a need for modernising the sport including attention to animal welfare issues, which might partly account for apparently growing public disillusion.

**Keywords**: horseracing, attendance demand, sport, leisure time

**JEL codes:** L83, D12, C23

**Introduction**

Although American racing has experienced significant secular decline (Riess, 2014), it remains an important sport in many jurisdictions, including France, Ireland, Australia and Japan. Indeed, in Britain, it is second only to football in number of spectators, 5.6m in 2019. Moreover, in addition to serving a large consumer market, it leaves a large economic footprint relative to many sports, given the complex supply chain. In addition to the direct labour force, horses have to be bred, sold to owners, exercised, trained, stabled, fed, shod, tended to by veterinarians and transported between scattered venues to compete in races. It is therefore unsurprising that horseracing in Great Britain has been claimed to generate £3.5b annual expenditure and support 85,000 jobs (Deloitte, 2014).

Academic research has almost entirely neglected the study of consumer preferences for horseracing. Thus, while attendance demand studies are a staple of sports economics, we could locate only two focused on horseracing. Morgan and Vasché (1979) analysed attendances at Californian racetracks where each of 73 data points represented annual attendance at a particular track; regressors included real income and the unemployment-rate. Thalheimer and Ali (1995) modelled time-series of annual attendance at three race-tracks near Cincinnati. Our analyses potentially offer richer insights because we drill down to the level of the individual race-day and employ data from multiple tracks over 18 years.

 Attendance is a crucial issue for the sustainability of racing. Fixtures are promoted by racecourses and, according to recent data, 47% of racecourse revenue in Britain comes from racegoers (Racecourse Association, 2020). Most of the remainder derives from off-track betting, notably payments for streaming of races to bookmaker shops and a statutory levy on bookmaker winnings from bets on British races by UK residents. This levy is collected on a national basis and does not accrue directly to individual racecourse companies. However, they benefit to the extent that the bulk of revenue raised is distributed to racecourses as payments specifically to be used to increase prize money.

 Our first purpose in presenting econometric models of race-day attendance in Britain is that they could be employed or adapted by managers of individual racecourses, and racecourse groups, to predict the effect on ticket sales of varying their programmes, e.g. increasing prize money or shifting fixtures from afternoon to evening (subject to restrictions imposed by the sport’s governing body). Models could also be used to set benchmark attendance figures for race-days against which to judge marketing interventions, e.g. providing a concert as supplementary entertainment. Likewise, at a national level, the governing body, which allocates some race-days between courses, could simulate the potential of alternative fixture lists to increase aggregate attendance.

 Our second, more general motivation is that findings on particular covariates should contribute to better understanding of consumer preferences for horseracing, in Britain and elsewhere, which would help guide managers as they search for ways of making the sport more relevant to potential customers. For the British case, we were interested to identify trends in the underlying interest of the public to attend race-days, which is hard to discern from time-series of aggregate attendances given significant changes in the size and shape of the fixture list.

 There has been extensive prior research modelling attendances in major team sports (Storm et al., 2018, includes a useful survey) and these inform managers of leagues and clubs in understanding what product attributes appeal to spectators. There has been no such study serving this purpose in horseracing and indeed few relating to other individual sports. In demonstrating how previous models developed for team sports may be adapted to the setting of an individual sport, we hope to provide a template for further broadening of the research base on what attracts an audience.

 We start by describing the pattern of racing offered in Britain and trends evident since 2000. Then we build an attendance model and present results. Throughout we employ attendance records from the Horserace Betting Levy Board and data from the British Horseracing Authority (BHA) documenting every race during 2001-2018. We aggregated these microdata to the levels of race-days and meetings. A ‘race-day’ is a set of races run at a particular course on a particular day. A ‘meeting’ is a set of race-days held at a particular course on consecutive days. In the statistical modelling we employ data from the full period, 2001-2018.[[1]](#footnote-2)

**Trends in British racing**

Horseracing is scheduled daily except for 2-3 days around Christmas. The (currently) sixty active venues vary considerably in frequency of use. E.g., in 2018 Liverpool and Lingfield Park raced on eight and 82 days respectively. We distinguish three codes: flat on turf, flat on all-weather tracks, and jumps. Some venues specialise in one of these but others will offer (separate) fixtures under two or even three codes. Traditionally flat racing was a summer and jumps racing a winter sport, though with overlapping seasons. There is now more blurring of seasons. Flat on turf is still possible only March-November but the introduction of all-weather tracks (with floodlighting) in 1989 permitted year-round racing. The jumps season has also extended to make it a year-round sport; but the number of fixtures during summer is still relatively low.

 Perhaps the most striking change over the period was in the supply of race-days, which grew steadily, 1,150 in 2002 and 1,433 in 2018 (Figure 1). The proportion of the fixture list accounted for by all-weather tracks is now markedly higher than at the beginning of the period but most of the increase had occurred by 2008 as new all-weather tracks were introduced (although a further step increase in the number of all-weather fixtures occurred in 2018).

**Figure 1** Number of race-days, 2002-2018



However, the size of the active horse labour-force has failed to grow proportionately. Comparing 2018 with 2002, there was an increase of 26.5% in the number of fixtures but only 14.0% in the number of unique runners. Further, racehorse productivity was close to constant throughout. The number of races-run-per-horse was 4.85 in 2018 compared with 4.97 in 2002 and had never strayed outside 4.78-5.14 in the intermediate years. Figure 2 illustrates that runners-per-race at a race-day has exhibited a strong downward trend in each code (albeit with recent slight recovery in all-weather). One consequence has been an increase in races with an unacceptably low field size (Frontier Economics, 2017, termed the provision of a race with fewer than six runners a ‘service failure’).

**Figure 2** Mean of average field size, 2002-2018



Racing considers falling field size a major problem. Smaller fields tend to be associated with lower competitiveness and the spectator will tend to see less exciting racing and have a less satisfactory betting experience. BHA (2014) noted that Britain was the only major racing jurisdiction experiencing a significant fall in field size; mean field size was lower than in any of its comparators except the USA, e.g. about 2.9 lower than Hong Kong.[[2]](#footnote-3)

 Data on *aggregate* attendance present the impression of a robust sport. It had reached 5m in 1998 (Frontier Economics, 2017). This level was maintained and increased during our period, with the maximum recorded in 2015 (6.13m) and 5.71m in the final year, 2018. But growth of aggregate attendance has been achieved only by supplying considerably more racing. If one looks at an individual, typical race-day, an opposite picture emerges. Figure 3 shows median attendances. Comparing first and last years, the medians fell by 25.4% and 28.9% for flat and jumps respectively. The chart shows that all-weather racing attracts fewer spectators than race-days on turf; here also median attendance fell significantly over the period.

 Our raw data show for every year that mean are higher than median attendances, reflecting that the mean is raised by the presence of elite events attracting very large crowds. Over 2002-2018, mean attendances for flat and jumps declined by ‘only’ 6.8% and 12.4%. This is suggestive that public interest may have been maintained or increased for top events even while the bread-and-butter sport is in evident decline.

**Figure 3** Median attendances, 2002-2018



 Diminishing interest in attending race meetings would be all the more serious if it were not offset by trends in revenue from betting. Since off-track betting was legalised in Great Britain in 1961, racing’s share of expenditure on horse betting has been collected from a statutory body, the Horserace Betting Levy Board. Licensed betting operators (whether doing business on- or off-track) are obliged to pay to the Board a hypothecated tax on revenue from races held in Great Britain, currently levied at 10% of Gross Gambling Yield. (bettor losses). The money raised is employed partly to fund integrity and equine welfare activity provided across the sector but the bulk of funds is distributed to racecourses, to be directed into higher prize money.

 In 2002, the first year when the levy was applied to Gross Gambling Yield rather than to betting turnover, the levy raised £67.0m. This increased, to peak at £117.1m in 2008. Thereafter there was steep and steady decline. The decline was associated with channel shift towards online betting, which was provided mainly though British operators supplying the market from offshore jurisdictions. This allowed the operators to avoid paying the levy (and betting taxes). The Government acted to close this avoidance loophole by legislating to require those providing gambling services to UK residents to hold a British licence. Remote betting thereby became subject to the levy and levy income increased from £49.9m in 2017 to £95.0m in 2018, the first year of the new regime (Horserace Betting Levy Board, 2018[[3]](#footnote-4)).

 It is therefore possible to compare betting revenue at the beginning and end of our period on a like-for-like basis to the extent that the offshore sector was minimally important in 2002 and included in the scope of the levy in 2018. Although nominal revenue was higher in 2018, real revenue at 2002 prices, calculated using the Consumer Price Index, was static (£67.0m in 2002, £66.8m in 2018). However, it should be noted that, while real revenue from betting was essentially the same in 2018 as in 2002, there had been a 26.5% increase in the number of fixtures. The stylised facts for betting are therefore similar as for attendance: maintaining relative stability in the quantity demanded has required more product to be supplied.

M**odelling Attendance Demand**

Our unit of observation is the race-day. We had a complete record of attendances, 2001-2018. We used almost all of them (23,999). The exception was that we discarded ‘mixed’ race-days (where both flat and jumps races were offered). We estimated a separate model for each code.

 In each model the dependent variable is log (attendance). It is an obvious choice to use the log transformation because attendance has a highly skewed distribution with a concentration of ‘low’ values (hundreds or low thousands) but with some which are ‘very high’ (more than 70,000). Given the log-linear specification, coefficient estimates will be used to calculate proportionate impacts on expected attendance of changes in the values of predictor variables.

 We estimated the models with panel data methodology (xtreg command in Stata software). Racecourse fixed effects allowed each racecourse to have its own constant term, the values of which will depend on time-invariant (or near time-invariant) factors which make some venues more popular than others.[[4]](#footnote-5) Fixed effects modelling, of course, constrains the slope coefficients of the predictor variables to be the same. However, in practical application of the model by an individual racecourse, there would typically be sufficient observations for it to be viable for management to base the model only on data from its own venue. Further, two racecourse groups (Arena and Jockey Club) each own about one-quarter of the venues. Given fixtures are awarded to a racecourse owner, the model could be employed to explore switches of fixtures between courses within the same group.

For each code, our empirical model is then

 $Log A\_{irt}=α\_{i}+δ\_{t}+γX\_{irt}+ε\_{irt}$ (1)

Subscripts *i, r* and *t* denote course, race-day and year respectively. *Log* $A\_{irt}$, is the log of attendance, $α\_{i}$ represents course fixed effects and $δ\_{t}$ denotes year effects. $X\_{irt}$ is a vector of covariates with $γ$denoting a vector of coefficients to be estimated. Finally, $ε\_{irt}$ is an error term.

**Choice of covariates**

 We had no comparable published study to draw on when choosing predictor variables. However, there is a large literature on attendance demand in other sports. Similar to Storm et al. (2018), we viewed the taxonomy of Borland and Macdonald (2003) as presenting an appropriate framework for analysing attendance in a sport where there was no prior literature on demand.

 Borland and Macdonald (2003) represented influences on attendance as capable of being organised into five categories: consumer preferences; economic factors; quality of viewing; characteristics of the sporting contest; and supply capacity. The last reflects that demand modelling in sports often has to deal with many censored observations where attendance equals the stadium capacity such that true demand is unobserved. This is not a relevant factor in British racing, where sell-outs are very rare. We therefore proceed by grouping our set of covariates according to the first four headings. We comment here on reasons for including particular covariates. See Table 1 for detailed definitions.

 ‘Consumer preferences’ is a somewhat all-embracing heading. We already acknowledge that preferences may differ between the three codes by estimating separate models. Preferences may also change significantly over time and we include 17 *year dummies*, to capture shifts in demand caused by non-observed factors, including consumer tastes for use of leisure time.

 Borland and Macdonald (2003) speculated that ‘habit’ is one possible phenomenon to investigate under the heading of consumer preferences, e.g. attendance at one football match may make it more likely that a fan will support the next fixture. However, for English

**Table 1**

Description of Covariates

|  |
| --- |
| Consumer preferences |
| *days since last fixture* | number of days between the start of the current meeting and the previous fixture at that racecourse. |
| Economic factors |
| *regional weekly wage* | log of mean weekly wage (reported quarterly) from the economic region of the racecourse in 2018 prices.  |
| *unemployment-rate* | quarterly unemployment-rate in the standard economic region of the racecourse where the race-day took place. |
| *big meeting* | race-days which are part of (flat) the Guineas, Derby or St. Leger Meetings or Royal Ascot or Glorious Goodwood; (jumps) the Cheltenham Festival or the Grand National or King George VI Meetingsa; (all-weather) the All-Weather Championships Finals Day |
| *big flat fixture same day*/*big all-weather fixture same day/big jumps fixture same day* | *big flat fixture* *same* *day*=1 when there is a ‘big flat meeting’ on the same day as the subject meeting. *The big jumps/all-weather fixture same day* dummy variables are similarly constructed |
| *Wimbledon, Six Nations on tv*; *London Olympics*, *Ashes tests*; *FIFA World Cup, EURO Championship*. | *Wimbledon*=1if the race-day coincided with the tennis tournament; *Six Nations on tv* refers to televised international rugby matches; *London Olympics* covers the period of the 2012 Games; *Ashes tests* captures any influence from the final two tests of the England-Australia series in 2005b; *FIFA World Cup* and the football *EURO Championship* are for race-days taking place at the same timec as England was playing a match in the respective tournament. |
| Quality of viewing |
| *Monday afternoon start*, *Tuesday afternoon start*, etc, and time of day (*Mon.-Thu. evening start*, *Friday evening start* | ‘start’ refers to the time of the first race, an evening meeting is one where that race starts at 5 p.m. or later. Reference day is Saturday. |
| *bank holiday*  | =1 if the race-day is a public holiday; not defined to be mutually exclusive with the day of week variables.  |
| *month* *dummies* | Reference is October.  |
| *Rainfall* | Rainfall recorded on the race-day (source: Met Office Integrated Data Archive System).  |
| Characteristics of the sporting contest |
| *relative* *prize money* | total race-day prize money divided by the mean prize money for all race-days in that code in that year.  |
| *lowest prize money* | lowest prize money at the race-day divided by the mean of the lowest prize in each race-day in that code and year.  |
| *McCoy farewell* | =1 race-day where McCoy competed during his pre-retirement period. |
| *Crowley/Fallon/Moore/Sanders/Johnson* | =1 if the named jockey featured in the season after he had been Champion jockey. |
| *Frankel* | =1 for race-days where Frankel appeared after winning the 2,000 Guineas. |
| *fewer*/*more than seven races* | ‘seven races’ is the reference category.  |
| *big meeting*$×$*trend* | *big meeting*$×$year trend. |
| *mean field size* | mean field size for the race-day |
| *Shergar Cup* | race-day held in most years since 1999, where horses belong to teams which compete for points. |
| In the cases of Royal Ascot and the King George VI Meeting, there was one year where venue was switched because of redevelopment work. Here, ‘big meeting’ was still set to one but, for the fixed effects, the venue was taken as the temporary host course.These were the final games in a drama-filled series; ‘cricket fever’ was such that it was claimed that falls in football attendances were attributable to fans watching the cricket. During these games, television audiences reached 8m. That these contests generated abnormal interest may be gauged from the fact that, the next time England played Australia at home, in 2009, the television audience never reached 2m (Fordyce, 2015).Events were defined as taking place at the same time if any part of the scheduled time for the football match overlapped with a period from one hour before to one hour after the racing programme at the race-day. |

football, Forrest and Simmons (2006) demonstrated that attendances actually suffered when home matches were scheduled in rapid succession. The explanation could be diminishing marginal utility or, more simply, affordability of frequent attendance. In British horseracing, the number of fixtures has increased substantially over time, making for a more crowded programme. Hence, we include *days since last fixture* (at the same venue) as a covariate.

 ‘Economic factors’ in Borland and Macdonald (2003) include consumer incomes and availability of substitutes. We seek to capture temporal variations in incomes with the covariate log (*regional weekly wage*). We also include the regional *unemployment-rate*. Increased unemployment in the market area of a racecourse will put greater financial pressure on a proportion of potential attendees and may therefore reduce expenditure on racing, an effect demonstrated for English football by Buraimo et al. (2021). However, attendance at a race-day is a relatively time-intensive good and unemployment reduces the opportunity cost of time, with the possibility that some patrons will find it easier to attend, particularly since many fixtures are during working days.

 It is hard to know which goods or activities consumers view as relevant substitutes. The attendance literature focuses on rival sports events, which might be readily available spatially (e.g. Paul, 2003, found that other major league sports represented in a city depressed attendances at National Hockey League matches) or might clash temporally. Competition from events taking place on the same day, might be in the same or other sports and might be viewed in-person or on television. For example, Walrafen et al. (2019) detected adverse impacts on football attendance when higher-status football matches took place at the same time and Hynds and Smith (1994) reported depressed cricket attendances during Wimbledon tennis.

 Direct competition between racetracks is limited because the fixture list tends to avoid regional clashes. Further, most racegoers patronise only one track. However, some prospective patrons will travel to see the big race and others may choose to stay at home to watch on television. We include dummy variables, one for each code, representing *big fixture same day*.

 We experimented with variables representing competition from other sports, e.g. identifying race-days where professional football or cricket was taking place within a radius of the racecourse. We found no influence from these events. However, we found effects from some major televised sports events, particularly matches in major football tournaments which featured the English national team.

 ‘Quality of viewing’ will differ across racecourses, for example some are more compact than others such that spectators in the stands have a relatively good view of the whole of each race. Such factors and the general attractiveness of the venue should be captured by the racecourse fixed effects.[[5]](#footnote-6)

 Under ‘Quality of viewing’, following the taxonomy of Borland and Macdonald (2003), we include dummy variables to represent *day of week* and *time of day*. *Bank holiday* and *month* *dummies* are also included.

 About 70% of race-days in our data were one-day meetings. But other meetings may be two/ three days and a few major festivals last four, even five, days. In the data set for all-weather, there is a small number of meetings where there were up to eight days consecutive racing (always due to abnormal circumstances). In our specification, controls include dummy variables, such as *1st day of four* . For flat only, these were generally positive and significant, reflecting perhaps that multi-day meetings could be regarded as similar to festivals. In all-weather, where tracks are generally used frequently, these variables were typically negative and significant. However, to conserve space we will not show results for these 33 variables.

 To test for weather effects, we collected data on rainfall at the nearest active weather station on the race-day. As the network of reporting stations varies, this will not always have been the same location relative to the racecourse on any two dates.

 ‘Characteristics of the sporting contest’ is the final set of influences according to Borland and Macdonald (2003). We proxy quality of race-day by the relative *prize money* on offer, entering it as a quadratic to allow for diminishing returns. In line with tournament theory, we expect high prize money in a set of races to result in faster speed, and therefore greater spectacle for spectators, both because of a selection effect (better horses are entered) and because of incentives for the jockey to elicit greater effort from the horse when the marginal gain from success is high. Using American data, Coffey and Maloney (2010) found that both effects were significant in accounting for the speed at which a race was run, the latter effect demonstrated by exploiting information on how close the race had been at the mid-point (which affected speed in horse races, but not in their analysis of dog races, where the dog is not partnered by a human agent conscious of the expected marginal revenue from extra effort).

 High prize money in the race-day may be consistent with there being some very routine individual contests: the bulk of prize money may be allocated to a single feature race. Consumers’ response to total prize money may be modified by how the prize money is distributed. We include *lowest prize money* (and its square) as additional regressors.

 A few papers have tested for superstar effects. In team sports, it is relatively easy to identify a star player effect because the player appears at each away stadium in turn, allowing the researcher to detect attendance gains (in US soccer, e.g., Sung and Mills, 2018, found an increase in attendances from designated players featuring on visiting teams).This approach is less feasible for individual sports although Chmait et al. (2020) were able to use sessional post-draw ticket sales at the Australian Open tennis to detect strong increases where Roger Federer was likely to appear. In the case of horseracing, the highest-level jockeys tend to compete at the highest-level meetings and barring injury, will always be present at those meetings, making it hard to discern an influence independent of our quality indicator (prize money). Moreover, over the period we did not find many jockeys who stood out in public recognition. Nevertheless, we experimented with including dummy variables for each jockey who had been ‘champion jockey’, setting the relevant value to 1 in the season following his championship. We retained for the final model only the four jockeys who, in the season after their championships, appeared to attract additional spectators (to a statistically significant extent).

 A.P. McCoy, who was jumps champion every year, 1995-2016, did not appear to attract extra spectators, which is plausibly explained by his typically racing at the lead meeting on any given day, making it hard to separate the effect of his presence from covariates capturing racing quality. On the other hand, we were able to test for an effect from there being a series of race-days when racegoers had the opportunity to see this ‘legend’ for the last time. In February 2015, he announced he would retire in April. We are therefore able to observe the impact on attendance of his ‘farewell tour’, employing the dummy *McCoy* *farewell*.

 Equine superstars may also emerge: individual horses occasionally capture the public imagination. Over our period, with advice, we identified Black Caviar, Denman, Enable, Frankel, Kauto Star, Monet’s Garden, Sea The Stars and Sprinter Sacre as potentially superstars. For each, we studied the horse’s record and formed a judgement as to the race where the horse had made the leap to celebrity. Thereafter, any race-day where the horse appeared had its dummy variable set to 1. In the event, only one of these was significant in preliminary analysis, so only *Frankel* appears in the final model. The first of the eight races for which *Frankel*=1 was run on June 14, 2011. In his preceding race, he had won the classic 2,000 Guineas by 6 lengths, the largest victory margin in the race since 1947.

 In racing, unlike most sports, entertainment offered may vary in quantity as well as quality. The large majority of race-days included either six or seven races. We included dummies for the number of races to test the possibility that a seventh race would attract greater attendance. There were also rare cases with fewer races than six, always because of abandonment (e.g. due to adverse weather), and occasionally there were days with eight or even more.

 In horseracing, there are prestigious events which feature races where the winner is recognised as a ‘champion’ in its class, e.g a hurdler or three-year-old flat racer. Such events always have high prize money but it is plausible that there will be an additional effect on attendance because of the prestige of the occasion. Hence, we designate some race-days as belonging to the category of *big meeting*.

 We suspect that racing fans will be drawn in greater numbers to race programmes with competitive intensity and this should be captured in the models. As noted above, the governing body itself regards field size as an indicator of competitiveness. And more runners also make for more spectacle. The BHA has identified increasing field size as a priority objective. Consequently, we include *mean field size* (and its square) in the specification.

 Finally, we have referred to racing as an individual sport but it has in fact experimented with a team format. The dummy variable *Shergar Cup* references a race-day, held most years since 1999, where the horses in the various races belong to teams which compete with each other for points. Currently the teams are Great Britain and Ireland, Europe, Rest of the World, and ‘the girls team’ for female jockeys. It is relevant to test the impact on attendance given plans for a major team event series of meetings in 2021. Summary statistics for the variables are presented in Tables 2a and 2b.

**Table 2a**

Summary statistics (continuous variables)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | mean | standard deviation | minimum | maximum |
| Flat (n=9,745) |
| attendance | 6,150.9 | 7,844.5 | 289 | 78,790 |
| log regional weekly wage | 6.408 | 0.103 | 6.201 | 6.624 |
| unemployment-rate | 5.598 | 1.735 | 2.800 | 11.600 |
| days since last fixture | 22.006 | 39.164 | 2 | 608 |
| relative prize money | 0.999 | 1.874 | 0.027 | 32.853 |
| lowest prize money | 1.000 | 1.764 | 0 | 84.467 |
| mean field size | 10.176 | 2.334 | 4 | 20.857 |
| rainfall | 2.045 | 4.498 | 0 | 76.400 |
| All-Weather (n=5,147) |
| attendance | 1,111.0 | 1,089.2 | 111 | 18,598 |
| log regional weekly wage | 6.446 | 0.105 | 6.207 | 6.624 |
| unemployment-rate  | 5.583 | 1.650 | 2.800 | 10.700 |
| days since last fixture | 5.411 | 7.707 | 2 | 327 |
| relative prize money | 0.996 | 0.839 | 0.121 | 22.715 |
| lowest prize money | 1.000 | 0.731 | 0.515 | 34.360 |
| mean field size | 9.679 | 1.763 | 4.714 | 16.167 |
| rainfall | 2.388 | 4.842 | 0 | 64.5 |
| Jumps (n=9,107) |
| attendance | 4,107.6 | 6,845.9 | 79 | 71,293 |
| log regional weekly wage | 6.384 | 0.090 | 6.190 | 6.624 |
| unemployment-rate  | 5.740 | 1.771 | 2.8 | 11.6 |
| days since last fixture | 25.329 | 37.458 | 2 | 1,390 |
| relative prize money | 0.998 | 1.552 | 0.0613249 | 25.213 |
| lowest prize money | 0.998 | 1.182 | 0 | 16.729 |
| mean field size | 9.368 | 2.296 | 3.333 | 22.667 |
| rainfall | 2.323 | 4.693 | 0 | 96.2 |

**Table 2b**

Mean values (dummy variables)

|  | Flat | All-Weather | Jumps |
| --- | --- | --- | --- |
| big flat fixture same day | 0.108 | 0.031 | 0.037 |
| big all-weather fixture same | 0.0004 | 0.0008 | 0.0001 |
| big jumps fixture same day | 0.004 | 0.034 | 0.023 |
| London Olympics | 0.006 | 0.002 | 0.001 |
| Wimbledon | 0.088 | 0.020 | 0.017 |
| Six Nations on tv | 0.002 | 0.030 | 0.039 |
| fourth Ashes test (2005) | 0.001 | 0.000 | 0.000 |
| fifth Ashes test (2005) | 0.001 | 0.000 | 0.000 |
| FIFA World Cup | 0.003 | 0.001 | 0.001 |
| EURO Championship | 0.002 | 0.001 | 0.000 |
| Monday afternoon start | 0.075 | 0.122 | 0.089 |
| Tuesday afternoon start | 0.099 | 0.112 | 0.096 |
| Wednesday afternoon start | 0.100 | 0.122 | 0.119 |
| Thursday afternoon start | 0.105 | 0.093 | 0.132 |
| Friday afternoon start | 0.116 | 0.101 | 0.116 |
| Mon.-Thu. evening start | 0.137 | 0.180 | 0.066 |
| Friday evening start | 0.065 | 0.055 | 0.016 |
| Sunday | 0.064 | 0.031 | 0.131 |
| Bank Holiday | 0.027 | 0.013 | 0.040 |
| January |  | 0.135 | 0.086 |
| February |  | 0.119 | 0.089 |
| March | 0.007 | 0.108 | 0.117 |
| April | 0.072 | 0.080 | 0.101 |
| May | 0.152 | 0.047 | 0.101 |
| June | 0.179 | 0.049 | 0.053 |
| July | 0.192 | 0.044 | 0.044 |
| August | 0.185 | 0.054 | 0.044 |
| September | 0.125 | 0.062 | 0.038 |
| November | 0.009 | 0.106 | 0.131 |
| December |  | 0.117 | 0.110 |
| A.P. McCoy farewell |  |  | 0.005 |
| Crowley | 0.015 | 0.013 |  |
| Fallon | 0.059 | 0.019 |  |
| Moore | 0.041 | 0.020 |  |
| Sanders | 0.012 | 0.017 |  |
| Johnson |  |  | 0.080 |
| Frankel | 0.001 |  |  |
| fewer than seven races | 0.361 | 0.228 | 0.301 |
| more than seven races | 0.175 | 0.361 | 0.055 |
| big meeting | 0.040 | 0.001 | 0.015 |
| Shergar Cup | 0.002 |  |  |
| 2001 | 0.049 | 0.033 | 0.014 |
| 2003 | 0.057 | 0.032 | 0.054 |
| 2004 | 0.057 | 0.043 | 0.055 |
| 2005 | 0.055 | 0.045 | 0.054 |
| 2006 | 0.051 | 0.058 | 0.055 |
| 2007 | 0.051 | 0.058 | 0.052 |
| 2008 | 0.054 | 0.072 | 0.055 |
| 2009 | 0.059 | 0.066 | 0.055 |
| 2010 | 0.060 | 0.063 | 0.053 |
| 2011 | 0.059 | 0.062 | 0.063 |
| 2012 | 0.054 | 0.063 | 0.057 |
| 2013 | 0.057 | 0.065 | 0.059 |
| 2014 | 0.057 | 0.063 | 0.060 |
| 2015 | 0.057 | 0.064 | 0.061 |
| 2016 | 0.056 | 0.064 | 0.060 |
| 2017 | 0.057 | 0.065 | 0.063 |
| 2018 | 0.056 | 0.070  | 0.060 |

**Results and discussion**

Horseracing differs from most sports subject to previous attendance modelling research. Events are organised independently rather than in a league format; there is no concept of attendees being driven by loyalty to a team; season-ticket holding is minimal. Nevertheless, results in Table 3 show the importance of some familiar drivers of demand. E.g., weekend events are more popular than weekday, attendances are higher in warmer months, crowd size responds to the quality of talent on show (proxied by prize money) and to how competitive the action is likely to be (proxied by field size). The importance of quality in particular confirms that, in British racing, the sport is not merely an adjunct to gambling. While, for many, betting may be an important part of the race-day, there would be no reason to expect such sensitivity of attendance to quality if spectators typically saw horses merely as ‘equine dice’.

 Nearly all covariates contribute to predictive power. However, we also employ the model to draw out more general insights relevant to the strategic choices racing must make and these are presented in Table 4

**Table 3**

Regression results, dependent variable ln(attendance)

|  | Flat | All-Weather | Jumps |
| --- | --- | --- | --- |
|  | coeff. estimate | ǀzǀ | coeff. estimate | ǀzǀ | coeff. estimate | ǀzǀ |
| log regional weekly wage | 0.0495 | 0.29 | 0.4333\* | 1.72 | 0.3389\*\* | 2.38 |
| unemployment-rate | -0.0082 | 1.14 | 0.0313\*\*\* | 2.64 | -0.0014 | 0.23 |
| big flat fixture same day | -0.0441\*\*\* | 3.53 | 0.0348 | 0.94 | 0.0112 | 0.57 |
| big all-weather fixture same day | 0.2002 | 1.13 | 0.0884 | 0.43 | 0.4671 | 1.49 |
| big jumps fixture same day | -0.0830 | 1.34 | 0.0359 | 1.06 | 0.2706\*\*\* | 11.12 |
| London Olympics | 0.1232\*\* | 2.57 | -0.1249 | 1.04 | -0.1233 | 1.22 |
| Wimbledon | -0.0412\*\*\* | 2.93 | -0.1743\*\*\* | 3.75 | -0.1225\*\*\* | 4.24 |
| Six Nations on tv | -0.2388\*\* | 2.57 | -0.1127\*\*\* | 2.97 | -0.0229 | 1.16 |
| fourth Ashes test (2005) | -0.1848\* | 1.88 | 0.1406 | 0.35 | -0.0497 | 0.27 |
| fifth Ashes test (2005) | -0.0265 | 0.27 | -0.9585\*\* | 2.37 | -0.0878 | 0.39 |
| FIFA World Cup | -0.2213\*\*\* | 3.19 | -0.4246\*\*\* | 2.75 | -0.0836 | 0.70 |
| EURO Championship | -0.1914\*\* | 2.48 | -0.4245\*\* | 2.08 | -0.2382 | 1.30 |
| rainfall | -0.0082\*\*\* | 5.78 | -0.0042\* | 1.91 | -0.0066\*\*\* | 5.84 |
| rainfall squared | 0.0002\*\*\* | 4.20 | 0.0000 | 0.47 | 0.0001\*\* | 2.39 |
| Monday afternoon start | -0.9532\*\*\* | 54.53 | -0.9857\*\*\* | 41.14 | -0.6023\*\*\* | 37.51 |
| Tuesday afternoon start | -0.9208\*\*\* | 57.70 | -0.8751\*\*\* | 35.25 | -0.6247\*\*\* | 39.35 |
| Wednesday afternoon start | -0.8196\*\*\* | 50.76 | -0.7980\*\*\* | 34.22 | -0.6170\*\*\* | 43.31 |
| Thursday afternoon start | -0.8719\*\*\* | 56.55 | -0.8400\*\*\* | 33.02 | -0.5898\*\*\* | 41.72 |
| Friday afternoon start | -0.7301\*\*\* | 46.97 | -0.7038\*\*\* | 28.39 | -0.4171\*\*\* | 28.80 |
| Mon.-Thu. evening start | -0.6634\*\*\* | 43.35 | -0.8702\*\*\* | 36.65 | -0.5597\*\*\* | 30.63 |
| Friday evening start | -0.0511\*\*\* | 2.75 | -0.4721\*\*\* | 15.27 | -0.1001\*\*\* | 3.36 |
| Sunday | -0.2289\*\*\* | 13.28 | -0.3641\*\*\* | 9.94 | -0.1287\*\*\* | 9.54 |
| Bank Holiday | 0.0145 | 0.57 | 0.5233\*\*\* | 9.25 | 0.3528\*\*\* | 16.94 |
| January |  |  | -0.2599\*\*\* | 9.35 | -0.4430\*\*\* | 25.71 |
| February |  |  | -0.2359\*\*\* | 8.13 | -0.2812\*\*\* | 16.07 |
| March | 0.0499 | 1.07 | -0.1403\*\*\* | 4.78 | -0.1834\*\*\* | 11.37 |
| April | 0.0455\*\* | 2.20 | 0.0043 | 0.14 | -0.0239 | 1.47 |
| May | 0.1092\*\*\* | 6.33 | 0.1223\*\*\* | 3.56 | 0.0322\* | 1.90 |
| June | 0.3401\*\*\* | 19.43 | 0.3581\*\*\* | 9.53 | 0.2259\*\*\* | 10.67 |
| July | 0.4715\*\*\* | 26.73 | 0.5054\*\*\* | 13.98 | 0.2962\*\*\* | 13.01 |
| August | 0.4248\*\*\* | 24.53 | 0.4853\*\*\* | 14.65 | 0.3687\*\*\* | 17.05 |
| September | 0.2090\*\*\* | 12.26 | 0.1784\*\*\* | 5.90 | 0.1205\*\*\* | 5.65 |
| November | -0.0087 | 0.22 | -0.1667\*\*\* | 6.18 | -0.1126\*\*\* | 7.34 |
| December | 0.0000 | . | 0.0516\* | 1.88 | -0.0848\*\*\* | 5.20 |
| days since last fixture | 0.0012\*\*\* | 11.17 | 0.0054\*\*\* | 7.26 | 0.0008\*\*\* | 8.30 |
| relative prize money | 0.0896\*\*\* | 14.66 | 0.0778\*\*\* | 4.43 | 0.2189\*\*\* | 23.24 |
| relative prize money squared | -0.0032\*\*\* | 12.96 | -0.0031\*\* | 2.03 | -0.0073\*\*\* | 15.02 |
| lowest prize money | 0.0704\*\*\* | 8.86 | 0.1252\*\*\* | 3.33 | 0.0261\* | 1.96 |
| lowest prize money squared | -0.0009\*\*\* | 8.28 | -0.0027\*\*\* | 2.88 | -0.0021\*\* | 2.04 |
| A.P. McCoy farewell |  | . |  | . | 0.2266\*\*\* | 4.72 |
| Crowley | 0.1156\*\*\* | 3.39 | 0.0696 | 1.25 |  |  |
| Fallon | 0.0008 | 0.04 | 0.1144\*\* | 2.50 |  |  |
| Moore | 0.0373\* | 1.80 | 0.0596 | 1.39 |  |  |
| Johnson |  |  |  |  | 0.0526\*\*\* | 3.26 |
| Frankel | 0.3345\*\* | 2.57 |  |  |  |  |
| fewer than seven races | -0.0278\*\*\* | 2.87 | -0.0450\*\*\* | 2.71 | -0.0269\*\*\* | 3.20 |
| more than seven races | 0.0252\*\* | 2.29 | -0.0123 | 0.83 | 0.0556\*\*\* | 3.58 |
| big meeting | 0.1964\*\*\* | 4.07 | -0.5611 | 0.57 | 0.5493\*\*\* | 6.66 |
| big meeting$×$trend | -0.0028 | 0.77 | 0.0200 | 0.29 | 0.0182\*\*\* | 3.00 |
| mean field size | 0.0688\*\*\* | 6.23 | 0.1825\*\*\* | 6.09 | 0.0667\*\*\* | 6.82 |
| mean field size squared | -0.0022\*\*\* | 4.48 | -0.0067\*\*\* | 4.44 | -0.0018\*\*\* | 3.71 |
| Shergar Cup | 0.0077 | 0.08 |  |  |  |  |
| 2001 | -0.0584\*\* | 2.43 | -0.0782 | 1.37 | -0.0705\*\*\* | 3.00 |
| 2003 | 0.0615\*\*\* | 2.84 | 0.0285 | 0.64 | -0.0121 | 0.59 |
| 2004 | 0.0068 | 0.30 | -0.0460 | 1.06 | -0.0219 | 1.04 |
| 2005 | 0.0110 | 0.45 | -0.1448\*\*\* | 3.24 | -0.0333 | 1.53 |
| 2006 | -0.0212 | 0.83 | -0.1622\*\*\* | 3.52 | -0.0722\*\*\* | 3.14 |
| 2007 | -0.0245 | 0.93 | -0.1918\*\*\* | 3.98 | -0.0772\*\*\* | 3.26 |
| 2008 | -0.1098\*\*\* | 4.28 | -0.2283\*\*\* | 4.81 | -0.1562\*\*\* | 6.70 |
| 2009 | -0.1666\*\*\* | 5.10 | -0.4609\*\*\* | 8.12 | -0.1788\*\*\* | 6.35 |
| 2010 | -0.1302\*\*\* | 4.08 | -0.3561\*\*\* | 6.23 | -0.2025\*\*\* | 7.12 |
| 2011 | -0.0972\*\*\* | 3.09 | -0.2620\*\*\* | 4.70 | -0.1368\*\*\* | 5.04 |
| 2012 | -0.1629\*\*\* | 5.11 | -0.3604\*\*\* | 6.47 | -0.1961\*\*\* | 7.27 |
| 2013 | -0.1561\*\*\* | 5.30 | -0.3875\*\*\* | 7.08 | -0.2543\*\*\* | 9.91 |
| 2014 | -0.1572\*\*\* | 6.38 | -0.2590\*\*\* | 5.64 | -0.1994\*\*\* | 9.23 |
| 2015 | -0.1477\*\*\* | 6.15 | -0.1517\*\*\* | 3.45 | -0.1731\*\*\* | 8.29 |
| 2016 | -0.1795\*\*\* | 7.34 | -0.1795\*\*\* | 4.07 | -0.2165\*\*\* | 10.06 |
| 2017 | -0.2499\*\*\* | 9.56 | -0.2110\*\*\* | 4.67 | -0.2315\*\*\* | 10.47 |
| 2018 | -0.2192\*\*\* | 8.78 | -0.3395\*\*\* | 7.78 | -0.3219\*\*\* | 14.21 |
| constant | 7.6989\*\*\* | 6.96 | 3.4185\*\* | 2.10 | 5.5922\*\*\* | 6.18 |
| observations |  9745 |  5147 |  9107 |
| *R*2 within |  0.628 |  0.606 |  0.653 |
| *R*2 between |  0.845 |  0.249 |  0.795 |
| *R*2 overall |  0.638 |  0.566 |  0.651 |

**Table 4**

Other insights

|  |  |
| --- | --- |
| Variable | Interpretation |
| *income elasticity* | Limited evidence that temporal variations in average income in the region influence racecourse admissions except for jumps where an elasticity of +0.361 is estimated. |
| *unemployment-rate* | The regional unemployment-rate is significant only for all-weather. The positive sign suggests attendance increases when potential attendees have more leisure time. In contrast to other codes, all-weather fixtures are often ‘twilight’ meetings and frequency of events at particular tracks is high. |
| *scheduling* | Crowds are much higher on Saturdays than other days. Results show that an identical flat race-day run on Monday would be expected to reduce the crowd by about 61% compared with Saturday.a Effects for other days and for jumps are smaller but still very large. A notable exception is that Friday evening flat and jumps programmes have proved popular. Though still statistically significantly lower than on Saturday, the demand for flat racing appears to be only 5% lower (9.5% in the case of jumps) making Friday evening more like the weekend than like midweek.b |
| *days since last fixture* | Strongly significant for all three codes. Effect size highest for all-weather, where, e.g., a decrease of one week is associated with a 3.7 % fall in attendance. |
| *weather* | Negative effect on attendance at flat and all-weather. There is still a statistically significant impact on jumps but effect size is appreciably lower. For flat, a thoroughly wet day (15mm of rain rather than none) would depress expected attendance by 11.3% underlining the importance of promoting advance ticket sales to reduce the risk of losing revenue due to poor weather and/or seeking weather insurance cover.  |
| *prize money* | Audience size proves sensitive to quality in all three codes with effect highest in jumps, e.g., doubling the prize money from that of an average race-day (relative prize money=1) to that of a better race-day (relative prize money=2) would increase expected attendance by 50%. Note that the variable is measured relative to other races in the same year and results cannot be used to predict the effect of increasing prize money across the board over time.  |
| *field size* | Additional horses have only very small effects on expected audience if field-size-per-race is already around 10. Where field sizes are low, the proportionate effect on attendance of an extra horse-per-race becomes more telling. An increase from 6 to 7 in runners-per-race would raise expected attendance by more than 4% at flat and jumps race-days and by 10% at all-weather.  |
| *stars* | Kieron Fallon was one of the best-known flat jockeys in the data period. As a ‘top’ jockey, he competed relatively infrequently in all-weather racing. Given that meetings at each all-weather track are quite frequent, his appearance at a particular fixture would plausibly attract those who are selective in terms of attendance. His presence raised expected (all-weather) attendance by 12%.Attendances at race-days at which jockey A.P. McCoy competed in the two months between announcing his retirement and his last ride are estimated to have been elevated by 25%. *Frankel* is estimated to have elevated estimated attendance by 39.7%. That seems a genuine superstar effect. It is conceivable that public interest in Frankel may also have increased attendances across sport but we cannot test this formally. |
| *number of races* | On the margin, quantity appears to influence attendance decisions, at least for flat and jumps. Coefficient estimates are highly significant even if effect size is modest. Adding a seventh race increases expected attendance at all-weather by nearly 5%.  |
| *competition with other events* | Big flat meetings appear to reduce the attendance at other flat meetings on the same day, by 4.4%. Anomalously, jumps fixtures tended to be much better attended when they coincided with major jumps festivals elsewhere. An England match in one of the summer football tournaments reduces expected attendance in flat (about 20%) and all-weather (about 35%).c Flat and all-weather seem to experience much lower crowds when Six Nations rugby is scheduled. Racing seems to be negatively affected by Wimbledon. On the other hand, attendances at flat races were relatively high at the time of the London Olympics, an event which lasted sixteen days and perhaps induced a national party mood. |
| *Team racing* | The effect is not significant. Perhaps the problem is that, in contrast to golf and tennis team events, the teams have been somewhat artificial constructs to which fans are unlikely to feel affinity. |
| a. Given the log-linear specification, the estimated percentage impact on the dependent variable of a one-unit increase in a predictor (such as from 0 to 1) is given by 100(e*β*-1) where *β* is the relevant coefficient estimate. b. It is clear that there is very low spectator demand on some days of the week. Nevertheless it may be worthwhile for the sport still to supply racing because this generates off-track betting turnover from which it extracts a share of bookmaker winnings and associated media rights.c. we detect no effect on jumps attendances but note that the number of observations is low as the football is scheduled outwith the main jumps season. |

 But, perhaps unusually for panel-data analysis, our main interest was in the year dummies.[[6]](#footnote-7) Here coefficient estimates show the difference in expected attendance if a similar race-day was offered in the particular year rather than in 2002. The pattern could be interpreted as revealing the trend in underlying interest in the sport in a context where stable aggregate attendance figures may have been achieved only by offering ever more race-days.

 The results tell a discouraging story. By 2018, cumulative decline was 19.7 % in flat racing, 28.8 % in all-weather and 27.5 % in jumps. Most of the difference in overall decline between codes is accounted for by a particularly poor year for jumps and all-weather in 2018. The story of decline over the whole period has some other subtle differences between codes. Decline in flat appears not to have set in until 2008; in jumps, it is noticeable from 2006; and all-weather seems to have recovered to some extent in 2014-2015 before decline set in once more.

 Raw attendance data appear to show a contrast in fortunes as between flagship events and more bread-and-butter meetings. However, the weakness of *big meeting*$×$*trend* suggests major festivals are little different in terms of the time-path of underlying interest. The discrepancy between the pictures presented in raw data and in regression results may be explained largely by a dramatic secular increase in the relative prize money allocated to big meetings. In 2002, mean race-day prize money at big meetings was 9.1 times that in the rest of the sport but the ratio in 2018 was 13.8. According to the models, this “should” have boosted attendance (indeed it seemed to be successful in attracting more international participation, raising quality) and accounts for what we see in the raw data.

 The extent and pattern of decline is revealed by coefficient estimates on the year dummies. To reveal the severity of the decline is one of the contributions of this paper because its measurement should focus on the important question of how the sport may be made more attractive. But of course the estimates cannot explain *why* race-days increasingly struggled to attract audience. Any discussion must necessarily be speculative. Speculation might appropriately be focused on the particularities of horseracing because decline in interest in attendance has not been a feature of other sports in Britain, e.g. aggregate attendance at sports events increased at a rate of 3.4% per annum over 2013-2019 (Cuttler, 2019).

 Since Becker (1965), economic theorists have predicted that, as the value of time increases, consumers will substitute less time-intensive for more time-intensive goods. Relative to many sports, attendance at horseracing is very time-intensive. Perhaps, in the absence of product innovation, this was always going to make horseracing vulnerable to changes in preferences over use of leisure time. In the face of decline in attendances over a long period, cricket, faced with a similar situation, was able to unlock a latent demand for shorter but intense events, first through one-day, then through the twenty-twenty format. Racing has not identified any such changes of format.

 Again, it might be that falling spectator demand for racing is associated with growing concern for animal welfare. Reiss (2014) identifies this as a source of decline in demand in America, characterising racing’s image as ‘a cruel and dangerous sport with too much reliance on whips and too many catastrophic injuries in major races’.

 In Britain and elsewhere, there appears to be growing distaste for using animals for entertainment. E.g., no British circuses now include animal acts, visitor numbers at London Zoo have declined in recent years (Association of Leading Visitor Attractions, 2020). Animal sports have not been exempt from the zeitgeist. In 2018, a referendum called by animal welfare groups in Florida overwhelmingly backed prohibition of greyhound racing (Anderson, 2018).

 It is not clear that the general population in Britain takes any more favourable a view of horseracing than Florida voters did of ‘the dogs’. In a large survey carried out for the industry (to which we were given access), about 60% of the general population agreed horseracing was ‘cruel’. Given seemingly growing concern with animal welfare, this is an unpromising background against which to attempt to develop new audiences.

 Concern over welfare extends across all stages of horse careers, from breeding (Stansall & Taylor, 2016), to whipping of horses at races, to their disposal after retirement. But probably the most debated issue is that of horse fatalities during races. Jumps presents the highest risk although deaths also occur in flat races. According to the BHA, the fatality-rate in British racing has been reduced to 0.4% of all horse runs in jumps and 0.1% in flat.[[7]](#footnote-8) For jumps, taking the mean number of runners observed at race-days in our data, this implies that there would be a horse death at about 30% of race-days. Moreover, horses in all codes are more likely to die at higher-grade and therefore better-attended events, probably because of faster pace and greater incentive to push horses to their limit (Rosanowski et al, 2018). All this suggests that a single race-day attendance in jumps carries a rather high risk of exposure to a fatality, a factor likely to deter attendance and motivate against repeat attendance.

 While our suspicion that animal welfare may be a significant factor diminishing attendance is speculative, it seems that the BHA and governing bodies in other jurisdictions have begun to recognise that welfare concerns are an obstacle to public acceptance of the sport. E.g., the BHA has published a new strategy to address welfare issues (Horse Welfare Board, 2020). Avenues being explored to improve equine safety include modification of fences and development of analytical models to help assess whether it is too risky for some horses to run. In 2018, South Africa trialled races where whipping was prohibited, acknowledging that seeing people hit animals was turning the public away from the sport (BBC, 2018). Of course change always runs the risk that attempts to woo new audiences alienate the old. However, the risk in this case may be lower than traditionalists admit (Evans & McGreevy, 2011).

 The definitive history of American racing, published in 1964, asserted that

Horse racing has grown astoundingly in scope and in popularity since the early settlers brought to these shores a native love for such contests of speed and stamina, and so permanently injected it into our way of life that today racing is America’s number one spectator sport (quoted by Baynham, 2017)

But this love proved not to be permanent after all. Baynham went on to note that racing had not even registered in a recent survey where Americans named their favourite sport. British racing is not in the same state as its US counterpart. It still attracts a large total audience, still generates significant media coverage, very few racecourses have closed and some have opened. But, notwithstanding that the American experience may be attributed to particular factors (including a failure to control doping), the history of the sport there illustrates that falling interest can move precipitously towards constituting an existentialist threat.

**Policy implications**

The negative trend in the sport’s spectator appeal identified here underlines that British racing could become non-sustainable at its present scale. Until 2015, aggregate annual attendances grew but this was achieved only by holding more fixtures. However, this strategy appears to have reached its natural end as the provision of yet more race-days has not prevented even aggregate attendances from beginning to decline. In our model, the significance of the variable representing frequency of meetings illustrated that expansion of the programme meets dimishing returns in terms of attendance and so more radical change may be needed if the sector is to avoid shrinkage in the medium-term. The industry in other jurisdictions faces similar issues.

 A limitation of our study is that, while factors like falling field size have been identified as having depressed attendance, there remains a strong negative trend for which there is as yet a lack of empirical evidence as to causes. There does appear to be a plausible argument that reduced public tolerance for the risks faced by animal participants has played a role in secular decline of race-day attendance. Racing everywhere is responding with numerous safety initiatives. Future research might seek to quantify the impact of fatalities at subsequent fixtures at a course to test the importance of welfare issues and the extent to which spectators are lost when exposed to horse deaths.

 Another possible fundamental problem for racing is that attendance is a very time-intensive activity, with a peculiary long time spent at the venue compared with the total number of minutes of sporting action. Racing might usefully investigate the feasibility of reducing turn-around time between races. Another area for investigation is whether packaging race-days with entertainment events or facilities might attract additional audience. Several racecourses have experimented with pop concerts after the final race but there has to date been no overall evaluation of such innovation. As our model could be used for benchmarking attendance, it could be employed to assess such inititiatives.

 As noted, we found that small field sizes made for reduced admissions. Racing is aware of the importance of boosting field size and has introduced a new feature whereby, in lower-status races, prize money is paid to owners whose horses finish in the first eight positions rather than the more traditional four. This ‘Appearance Money Scheme’ should be evaluated by researchers, who should also draw on other racing sports to identify mechanisms to incentivise horsemen to run their horses more often. Runs per horse remained stubbornly constant over our whole period as the number of races increased, a contributor to the phenomenon of small field sizes, which in turn deters spectating.

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1. However, charts illustrating the quantity of racing and aggregate attendance start with 2002 because aggregate data for 2001 were affected by cancellations due to an outbreak of foot-and-mouth. [↑](#footnote-ref-2)
2. The weak performance of Britain in terms of average field size was still obvious in 2018, the last year for which complete international data are available (International Federation of Horseracing Authorities, 2019). [↑](#footnote-ref-3)
3. Figures for earlier years were obtained from previous annual reports. The figures relate to financial years ending March 31. [↑](#footnote-ref-4)
4. The inclusion of racecourse fixed effects parallels the inclusion of home-team fixed effects in attendance studies using panel data from team sports. Racecourses and sports clubs will each have their own baseline market size from factors such as history, population nearby, quality of facilities, etc. [↑](#footnote-ref-5)
5. While many or most racecourses will have developed their facilities over the lengthy period we study, there was only one which essentially rebuilt from scratch.Ascot closed in 2004 and reopened in 2006. There had been a complete rebuild of all spectator facilities and a partial repositioning of the track itself. Some problems with the quality of viewing from a new stand were reported and these had to be corrected in more construction work before the project was finally complete in 2007. We experimented with separate dummy variables to represent Ascot in years before and after what was the biggest ever investment in British racing. There appeared to be no effect on attendance in 2006 compared with before but attendances subsequently appear to have been elevated by about 20% in the case of flat racing and 12% in the case of jumps days. This boost to attendance could be considered akin to the new stadium effect reported in North American major league (Coates and Humphreys, 2005) and minor league (Soebbing et al., 2016) sports. [↑](#footnote-ref-6)
6. However,in another sporting context and similar to us, Meier et al. (2016) focused on year dummies, testing whether the pattern revealed a secular increase in interest in attending women’s football in Germany. [↑](#footnote-ref-7)
7. Georgopoulus and Parkin (2016) report a fatality-rate of 0.19% among 1.89m runners in flat races in the USA and Canada over 2009-2013. [↑](#footnote-ref-8)