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Abstract

This research is aimed at assessing the determinants of TV audience for road professional cycling in Spain. Our audience data refer to cycling races broadcast on three Spanish TV channels and allow computing three different variables: *share*, *rating* and *viewers*. The outcomes show that potential audience ratings depend mainly on the following features: competitive balance, type of stage and race, nationality of the leader and calendar. So, *share*, *rating* and *number of viewers* variables increase when the competition is more balanced, when the stage is mountainous, when the leader is Spanish and when the race is scheduled at the weekend.

Keywords: cycling; broadcasting; television audience

Introduction

This research is aimed at assessing the determinants of TV audiences for road professional cycling in Spain. Cycling is one of the most popular sports in Spain and its coverage depends primarily on television. Cycling team sponsorship is provided by private companies with the aim of obtaining an advertising performance that justifies the investment. That is why broadcasting cyclist races is a necessary condition for this sport's survival. Since 1983, two of the three major cycling races (the *Vuelta* of Spain and the Tour of France) have always been broadcast on *Televisión Española* (*Spanish Public Television*), one of the leading general-interest channels. As for the third of the three-week major cycling stage races (the *Giro* of Italia), its coverage is less common and it is usually broadcast by regional channels, for example, ETB (the Basque Country channel) and TPA (the channel from the region of Asturias). Other races belonging to the UCI World Tour¹ (the so-called Classic races) and the Spanish regional stage races are also broadcast either by *Televisión Española* or by regional channels.

As it has already been noted, the survival of cycling as a professional sport depends on the advertising performance of sponsorship, and this, in turn, on the television broadcast of the main races. But over recent years, this sport's TV coverage has been declining. Audience indicators in Spain stood at record levels in the late 80's and the first 90's, during the "golden age" of Spanish cycling, due to the contribution of successful riders as Pedro Delgado (winner of two *Vueltas* and one *Tour*) and Miguel Indurain (winner of five Tours and two *Giros*). Subsequently, despite many successes among other Spanish riders, the doping scandals (basically the *Festina* affair in 1998 and the *Operación Puerto* affair in 2006) have eroded the prestige of this sport, causing a decline in TV audiences.

For all this, and given the great cycling dependence on TV ratings (this is a sport in which no entrance ticket is charged), it is quite interesting to know the main factors determining TV audiences. Knowing these factors would allow scheduling races in order to increase audience ratings, which would boost the sponsors' revenues and the

creation of new teams (it should be also noted that the number of professional teams has been reduced in recent years)².

The structure of this paper is as follows. In Section 2, we make a survey of the main papers devoted to the analysis of TV audience determinants for sport broadcasting. In Section 3, we present the estimations of a TV audience function by using three different indicators of audience: *share*, *rating* and *viewers*. Finally, in Section 4 we state a summary of the main conclusions reached.

Literature Review

There have been very few researches of this kind in Spain and no one devoted to cycling so far. We may cite only the papers by García and Rodríguez (2006) and Puente (2010). The former analyzes TV audience (number of viewers) for Spanish football using data for the period 2000-2003. Authors state that “ex-ante attractiveness of the match, proxied by the relative spending of the teams and the potential rivalry between the two clubs playing a match, is the main determinant of... the size of the audience” (p. 165). On the other hand, Puente’s paper analyzed TV audience for sports in the case of a Spanish regional TV channel, TPA. He found that football is the most popular sport in the region of Asturias and audience ratings tend to increase not only when TPA broadcasts Champions League matches, but also local teams’ ones (*Real Oviedo* and *Sporting de Gijón*).

Literature is not abundant in other countries. For the United States, some authors use Nielsen ratings to study the case of the National Football League (NFL) (Carney and Fenn, 2004; Paul and Weinbach, 2006) or basketball’s (Kanazawa and Funk, 2001)³. Carney and Fenn (2004) analyze the determinants of NFL viewership in the years 2000 and 2001, in order to calculate in advance the number of viewers for each game and so to fix more precisely the price of the advertisements during the games. This information is relevant for both the NFL and the trademarks which are advertised during the half times and for the channel broadcasting the game. They use

the Nielsen rating of TV audience in the local area as the dependent variable, and regress this rating against demographic variables and statistical data of the teams, among others. They conclude that in order to calculate the potential audience of an American football game it is necessary to account for several issues: the number of white inhabitants of the town, the income of the local area, the winning percentage of the team, the projected outcome of the game and the week the game is played.

Paul and Weinbach (2006) analyze the Nielsen ratings for Monday Night Football (NFL) to determine the main factors that attract viewers and conclude that “fans prefer games with a quality match-up between winning teams, a high level of uncertainty of outcome, and high-scoring” (p. 199).

Kanazawa and Funk (2001) try to determine whether the patterns of consumption of the NBA viewers are systematically correlated with the racial composition of the teams. For that, they use Nielsen ratings corresponding to the second half of the 1996/97 season. They find evidence of racially based patterns in the behaviour of the viewers, as the rating increases as the number of white players in the match rises, even when they are on the bench.

On the European side, Kuypers (1996) and Buraimo (2008) analyze TV audiences for the English football league. On the one hand, Kuypers (1996) wonders if the subscribers of the channel that broadcasts the football match may choose watching football or choose other activity. He uses the proportion of Sky Sports subscribers who watched English Premier League matches in the season 1993/94 as the dependent variable. This variable is explained by the importance of the match for the championship, the importance of the match depending on the relegation of one of the teams, the number of international players playing the match, the average attendance to the stadium in the last three years, the number of goals scored to the visitor team in the last three matches, and bets, among others. The results show that

particularly interesting matches (matches played between teams with historical rivalry) are not significant, as in general, these teams' supporters are the only ones who are interested in these matches⁴. It must also be highlighted that among all the goal variables, only the one that captures goals scored to the visitor team is significant, which suggests that the viewers expect the visitor team to be a weak team one more time. Kuypers (1996) suggests that TV channels should plan their matches offer with some flexibility and, finally, he concludes that the fact of broadcasting a match does not have an impact on the stadium attendance.

On the other hand, Buraimo (2008) assesses the demands for match-day attendances and TV audiences jointly for the English Premier League football matches during seven seasons (from 1997/98 to 2003/04). He uses TV ratings provided by the Broadcasters' Audience Research Board (BARB). In his paper, Buraimo concludes that "while televised matches depress stadium attendance, *ceteris paribus*, there is an important feedback in that larger stadium attendances have positive impacts on the size of television audiences" (p. 513).

Although these papers show clearly what are the most relevant features when explaining TV audience ratings for stadium sports (such as football or basketball), the case of road cycling is very specific. This is a sport in which no one pays an entrance ticket, and most people may only follow it on television. So, television broadcasting does not compete with stadium attendance. Besides, score rules are very different from those of football or basketball. In this sense, this paper could be considered as innovative, because we must define new specific indicators for the quality of contenders, the competitive balance and others, in order to explain the attractiveness of cycling for viewers.

Data and Estimation

Data

In this paper, we use data from Kantar Media, the firm who computes the “official” TV audience ratings in Spain. Our audience data refer to 256 cycling races (which are different stages of a stage race or different one-day races) broadcast on three Spanish TV channels: La2 (a public channel belonging to *Televisión Española-RTVE*), *Euskal Telebista* (ETB, which is the public Basque Country channel) and *Televisión del Principado de Asturias* (TPA, the public TV channel from the region of Asturias). The scope of TPA and ETB channels is regional (potential audience is about 1 million people for the former and 2 million for the latter). In the case of La2, sometimes Kantar Media provides us with audience data from the entire Spanish population (47 million people) but in other cases audience data refers only to the region of Asturias.

Audience information is obtained from a set of meters installed on television sets all over the country, and refers to three different variables: *share* (percentage of viewers who watch a program in relation to the total number of viewers that are watching the TV at that moment); *rating* (percentage of viewers of a program in relation to the total population); and *viewers* (average number of viewers of a particular program). *Rating* variable is quite similar to the American Nielsen rating, but it is not the same. Nielsen Media Research “defines a Nielsen rating as the number of televisions tuned in to a specific program divided by the number of total televisions in a specific viewing market” and “a household is considered to be tuned in to a game if the Nielsen meter indicates that the television set is tuned to the game for at least six minutes” (Carney and Fenn, 2004, pp. 7-8). In the Spanish case, Kantar Media computes ratings in a different way, because they report on the number of viewers rather than the number of television sets. So, the owner of the TV set must indicate who and how many people are watching the television at this moment⁵. Moreover, as in the case of British BARB rating, audience is monitoring every minute. So, a household is considered to be tuned in to a cycling race if the Kantar Media meter

shows that the television set is tuned to the stage for at least a minute. Then, minute audience ratings are averaged across the stage's duration to compute the ratings of the entire program⁶.

The main features of these ratings are shown in Table A.2 of the Appendix. As it can be observed, cycling audience is not so high at present. Average share of cycling races is about 6.4% for period 2007-2011, although some stages have been quite successful. For example, 20th stage of 2009 Tour of France, which was broadcast by La2 channel, reached a share of 24.6%. It was a mountain stage which finished at *Mont Ventoux*, a mythic mountain pass of the French cycling, in which the winner was a Spanish rider (Juan Manuel Gárate) and the leader of the overall standings was another Spanish (Alberto Contador, just ahead of Andy Schleck and Lance Armstrong). In terms of number of viewers, total audience range from 2.17 thousand people to 2.4 million in the case of the 13th stage of 2008 *Vuelta*, which was also broadcast by La2. It was a mountain stage won by the Spanish rider Alberto Contador that finished at *Alto del Angliru*, the hardest mountain pass climbed in a road cycling race in Spain, and one of the major mountain passes all around the world.

Estimations

It seems that certain types of cycling races are more prone to be watched than others, especially mountain stages belonging to long races (three week races) and with a Spanish leader. Is it actually true? To test this hypothesis, we need to estimate a model to explain the variability of audience ratings through a set of independent variables. These variables identify the most important determinants of TV audiences. What are these variables? Previous papers indicate that one of the main sport audience determinants is competitive balance (see, for example, Schmidt and Berry, 2001; Utt and Fort, 2002; Humphries, 2003; Paul and Weinbach, 2007).

- a) Competitive balance

Any sport audience increases with the degree of competition set by the athletes. Real competition in cycling is only possible when the performance of riders competing for the race is quite similar. In many cycling races, only a small group of riders are competing for the victory. Most riders only play the role of helping their team leaders to win. At the end, only two or three riders (the leaders of the strongest teams) compete for the overall standings. This allows us to assume that competitive balance does exist when the quality level of these two or three riders is quite similar. Is there any way to measure riders' quality in cycling? The answer is yes. Periodically, the International Cycling Union publishes the UCI World Tour Ranking, which orders the riders on a points scale depending on their standings in the main races held all around the world. Then, we can compare the quality of riders simply by comparing the number of UCI points obtained by them at the end of the previous season: the difference in the number of UCI points obtained by two riders could be considered as a proxy of the existing difference in quality and performance⁷. In the case of riders which are at the top of the overall standings, we assume that competitive balance increases as the difference in their UCI points decreases, giving place to a rise in TV audience. From this point of view, we compute two different variables to measure the degree of competitive balance in cycling. The first one is defined as the number of UCI points held by the rider who led the overall standings at the end of the previous stage/race minus the number of UCI points held by the second classified rider (*leader-second place UCI points difference*)⁸. The second variable is *leader-third place UCI points difference*, which is defined in the same way⁹. We assume that the comparison among the three first riders in the overall standings is the most accurate to proxy competitive balance.

But these variables are not the only competitive balance indicators that may be defined in the case of cycling races. Over a long race, such as the *Tour of France*, if there is real competition among riders the leader's jersey may change hands several times. If we assume that the greater the number of changes in leader, the greater the competition, then the *number of changes in leader* until the current stage could be another good index of competitive balance. Actually, the worst horizon for a long

cycling race (in terms of TV audience) is that in which a major rider holds the leader's jersey at the first stage, keeping it over the whole race until the end¹⁰.

b) Type of stage/race

Not all the stages have the same relevance in a long race. Many times, the final victory is based mainly on the extremely high performance of a rider during a mountain or a time-trial stage (these stages create big time differences in the overall standings). To keep positions is relatively easy in a flat stage by riding inside the main group, something that is not possible in a mountain or time trial stage. So, the effort of riders is the greatest in mountain or time-trial stages, increasing the show and then, the audience. So, a set of dummy variables named *mountain*, *flat* and *time-trial* are defined to pick up the effect of the features of the race on TV audience.

c) Long stage races

There are three long stage races whose prestige is over the rest of races for Spanish fans. They are the *Vuelta* of Spain, *Giro* of Italy and *Tour* of France¹¹. These courses have 21 stages and concentrate the attention of Spanish supporters for almost one month each. On many occasions, they are like an adventure story in which idols rise and fall, get sick and recover, or make real exploit riding alone against the main group for several hours. We expect the audience of these races to be higher than the audience of the rest of races. To test this hypothesis we include the following dummy variables in the estimation: *Vuelta of Spain*, *Giro of Italy* and *Tour of France*, being *other races* the reference category.

d) Nationality of the leader

Patriotic feelings are usually very important in explaining TV audiences, as Nüesch and Franck (2009) observed in the case of Swiss football. Cycling is also a sport that creates something like a national feeling in supporters. For Spanish ones, winning the *Tour*, the *Vuelta* or the *Giro* is a heroic deed, a big exploit, and when a Spanish

rider wins any of these races he becomes a national hero. For this reason, we include a dummy variable named *Spanish*, taking value 1 if this is the nationality of the leader at the end of the previous stage. In that case, audience ratings for current stage are expected to be higher.

e) Calendar effects

Many times, races' managers schedule the most relevant stages for the weekend when organizers expect the demand of any sport to be increased due to lower opportunity cost for viewers¹². So, a dummy variable which takes value 1 if the stage is held during the weekend is defined, with an expected positive sign. Sometimes, besides controlling for this time-of-week effect, this kind of papers includes also controls for the time-of-day (for example, a prime time variable, as in Kanazawa and Funk, 2001, p. 602). But in the case of cycling, almost all the races are broadcast only in the afternoon, between 3:30 pm and 5:00 pm. Although cycling races last around 6-7 hours, only the last kilometers are broadcast and never in prime time. So, in our case a time-of-day variable is unnecessary.

f) Inertial variables

This kind of researches usually includes some variables to detect inertial effects on the audience of a particular program. In our paper, we define several inertial variables depending on the estimation, which are *share*, *rating* and *viewers of the previous program* and *of the previous stage*. These kinds of inertial effects are usually very important, because former audience has always a pull effect over current audience for any kind of programs¹³. Therefore, we expect positive signs for all these variables.

g) Scope of the channel

Our data set include audience figures for two regional channels (ETB and TPA) and for a national one (La2). However, in the case of some specific races broadcast by

the national channel La2, we have only information about TV audience ratings at a regional level (for the region of Asturias). By this reason, it is necessary to control for the scope of the channel (the size of the potential audience) by including a dummy variable (*regional*) which takes value 1 if the race has been broadcast at a regional level and 0 otherwise. When the number of *viewers* is used as dependent variable, a set of dummy variables is included to identify the exact channel which has broadcast the race (*ETB regional channel*, *TPA regional channel* and *La2 regional scope*, being *La 2 national scope* the reference category) because it is necessary to control for the size of population. However, when the dependent variables are defined as percentages (as in the cases of *share* or *rating*) *regional* variable might be enough.

h) Scheduling of rival channels

Programs that compete with cycling races in other channels could also strongly condition the audience of this sport. To pick these effects up, a set of dummy variables measuring the scheduling of rival channels is included in the model in order to identify the degree in which alternative programs compete with cycling audience. These variables are *film*, *series*, *magazine*, *newsletter*, *quiz*, *documentary* and *other sports* (for example, variable *film* takes value 1 if any other major channel is broadcasting a film at the same time, and 0 otherwise)¹⁴.

i) Year dummies

Finally, we include a set of year dummy variables in the estimation in order to test if cycling audience decreases across seasons, due mainly to the effect of doping scandals (such as *Operación Puerto* affair in 2006, by which many important Spanish riders and team managers were accused as drug dealers)¹⁵.

Then, the model proposed to be estimated is:

Audience ratings =f(competitive balance, type of stage, long stage races, nationality of the leader, calendar effects, inertial variables, scope of the channel, scheduling of rival channels, year dummies)

The estimations outcomes are shown in Tables 1 and 2. Table 1 presents the coefficients and t-statistics for the Ordinary Least Squares (OLS) estimation of the audience equation when the dependent variables are *share* and *rating*, respectively; and Table 2 shows the OLS estimation of the audience equation when the dependent variable is the natural logarithm of the *number of viewers*¹⁶. It must be pointed out that the number of viewers is obtained by multiplying the rating variable by the total population of reference (from Asturias, Basque Country or Spain, depending on the scope of the channel). The use of natural logarithm of viewers makes it easier the interpretation of some of the estimated coefficients. So, in the case of dummy variables, coefficients must be interpreted as the relative increase (or decrease) in the number of viewers when this characteristic is present. When the independent variables are defined in natural logs (as in the case of *viewers of previous program*) their coefficients are elasticities¹⁷. Table 3 shows the estimated marginal effects (in percentages) for dummy variables and the estimated elasticities for continuous variables. All the estimations have a high power of explanation (high R-Square) and according to the F-statistics are jointly significant.

Estimations show, firstly, that competitive balance is one of the main TV audience determinants. Specifically, all audience indicators tend to rise as the UCI points difference between the leader and the third classified diminishes¹⁸. So, a 1% increase in this UCI points difference leads to a decrease of 0.06% in the *number of viewers* of the stage. However, the UCI points difference between the leader and the second classified is not significant. As far as the number changes in leader until the current stage is concerned this variable is significant and its coefficient is positive¹⁹. Then, the more the competitors strive for winning, the higher the TV audience ratings. In summary, competitive balance seems to play a very relevant role in determining TV audience for cycling in Spain.

Table 1. Television audience demand using Ordinary Least Squares (OLS): *Share* and *Rating*

	(1) Dependent Variable: <i>Share</i>		(2) Dependent Variable: <i>Rating</i>	
	<i>Coefficient</i>	<i>t-statistics</i>	<i>Coefficient</i>	<i>t-statistics</i>
Constant	2.301	1,06	1.018	2.26**
<i>Competitive balance</i>				
Leader-second place UCI points difference	-0.0002	-0.22	-0.00005	-0.18
Leader-third place UCI points difference	-0.002	-1.66*	-0.0005	-1.74*
Number of changes in leader	0.261	2.71**	0.075	3.32**
<i>Type of stage</i>				
Mountain	1.158	2.15**	0.250	1.96**
Flat	-0.499	-0.96	-0.162	-1.42
<i>Long stage races</i>				
Vuelta of Spain	-0.279	-0.38	-0.154	-0.86
Giro of Italy	-2.151	-4.19**	-0.545	-4.27**
Tour of France	1.075	1.78*	0.142	0.99
<i>Leader nationality</i>				
Spanish	0.919	2.25**	0.169	1.76*
<i>Calendar</i>				
Weekend	1.419	1.63*	0.129	0.72
<i>Variables of inertia</i>				
Share of previous program	0.285	4.27**	-	-
Share of previous stage	0.236	3.36**	-	-
Rating of previous program	-	-	0.286	4.81**
Rating of previous stage	-	-	0.207	2.84**
<i>Scope of TV channel</i>				
Regional	1.684	2.88**	0.214	1.55
<i>Scheduling of rival channels</i>				
Film	-0.124	-0.25	0.059	0.54
Series	-0.057	-0.10	-0.070	-0.49
Magazine	-0,148	-0.27	-0.116	-0.88
Newsletter	0.192	0.32	0.280	2.49**
Quiz	0.014	0.02	-0.159	-1.15
Documentary	0.119	0.21	0.003	0.02
Other sport	-0.434	-1.04	-0.117	-1.20
<i>Time dummies</i>				
Year 2008	0.018	0.01	-0.120	-0.32
Year 2009	-0.563	-0.39	-0.224	-0.59
Year 2010	-3.153	-2.16**	-0.851	-2.26**
Year 2011	-0.961	-0.62	-0.244	-0.60
R-squared	71.7		68.9	
F(24, 231)	20.3		20.0	
Number of observations	256		256	

** and * denote significance at the 5% and 10% levels

Reference category: Time-trial stage, other races, leader not Spanish, weekday race, La2 national scope, year 2007.

Table 2. Television audience demand using Ordinary Least Squares (OLS): Viewers

	(3) Dependent Variable: <i>Ln (Viewers)</i>	
	<i>Coefficient</i>	<i>t-statistics</i>
Constant	4.270	7.28**
<i>Competitive balance</i>		
Ln (Leader-second place UCI points difference)	0.014	0.61
Ln (Leader-third place UCI points difference)	-0.065	-2.65**
Number of changes in leader	0.053	3.03**
<i>Type of stage</i>		
Mountain	0.253	2.62**
Flat	-0.038	-0.41
<i>Long stage races</i>		
Vuelta of Spain	-0.162	-1.32
Giro of Italy	-0.344	-2.78**
Tour of France	0.118	1.18
<i>Leader nationality</i>		
Spanish	0.136	1.63*
<i>Calendar</i>		
Weekend	0.249	2.07**
<i>Variables of inertia</i>		
Ln (Viewers of previous program)	0.149	4.85**
Ln (Viewers of previous stage)	0.214	2.50**
<i>Scope of TV channel</i>		
ETB regional channel	-1.888	-5.85**
TPA regional channel	-2.391	-6.43**
La2 regional scope	-2.269	-6.52**
<i>Scheduling of rival channels</i>		
Film	-0.022	-0.23
Series	-0.128	-1.44
Magazine	0.027	-0.32
Newsletter	0.097	1.06
Quiz	0.030	0.32
Documentary	-0.013	-0.17
Other sport	-0.114	-1.40
<i>Time dummies</i>		
Year 2008	0.066	0.37
Year 2009	0.023	0.13
Year 2010	-0.442	-2.22**
Year 2011	0.122	0.66
R-squared		
		95.8
F(26, 187)		
		324.55
Number of observations		
		214

** and * denote significance at the 5% and 10% levels

Reference category: Time-trial stage, other races, leader not Spanish, weekday race, La2 national scope, year 2007.

Table 3. Marginal effects (for dummy variables) and elasticities (for continuous variables)

	<i>Share</i>	<i>Rating</i>	<i>Viewers</i>
<i>Marginal effects (Percentage of increase)</i>			
Mountain	18.0	15.9	25.3
Giro of Italy	-33.5	-34.6	-34.4
Tour of France	16.7	-	-
Spanish	14.3	10.7	13.6
Weekend	22.1	-	24.9
Regional	26.2	-	-
ETB regional channel	-	-	-188.8
TPA regional channel	-	-	-239.1
La2 regional scope	-	-	-226.9
<i>Elasticities</i>			
Leader-third place UCI points difference	-0.03	-0.03	-0.06
Number of changes in leader	0.12	0.14	0.17
Share of previous program	0.22	-	-
Share of previous stage	0.24	-	-
Rating of previous program	-	0.23	-
Rating of previous stage	-	0.21	-
Viewers of previous program	-	-	0.15
Viewers of previous stage	-	-	0.21

Secondly, as we expected, all the estimations show that mountain stages are more followed by the audience than others stages. Specifically, a *mountain* stage increases the *number of viewers* by 25% and increases *share* and *rating* about 18% and 16%, respectively. However, a *flat* stage does not create a significant difference in TV audience ratios with respect to the reference category (*time-trial stage*).

As for the effect of long races on TV audience, the estimations only show a clear and significant effect for the *Giro of Italy* (TV audience is lower for the *Giro* than for the reference category, *other races*, in all the cases). On the other hand, the *Tour of France* has a higher TV *share* than other races, *ceteris paribus*, but it does not have higher *rating* or *viewers*.

As expected, having a *Spanish race leader* is another relevant variable in explaining TV audience. Specifically, having a Spanish leader raises the *share* of the stage about 14%, and also increases the *number of viewers* and *rating* about 14% and 11%, respectively. This proves that, as it is usual for other sports, the audience of cycling has a nationalistic component, easily understood because of proximity, language and patriotic feeling.

Calendar effects seem to be also quite relevant in explaining the average *number of viewers* and *share*, although this variable is not significant for *rating* equation. In particular, if the stage is held at weekends, the *number of viewers* increases by 25% and *share* rises about 22%. It must be taken into account that the effects, for example, of being a mountain stage, having a Spanish leader, etc., have been already considered, and therefore, this higher audience is not explained by the specific features of the stages scheduled for weekends by the race managers, but by the fact that opportunity costs of watching TV diminish at weekends.

Inertial effects are also very important in explaining TV audience. Audiences of *previous program* and *previous stage* are always significant and positive sign. For example, *ceteris paribus*, a 1% rise in the number of *viewers of previous program* (*previous stage*) increases the *viewers* of current stage about 0.15% (0.21%).

Region also appears as a relevant feature of audience share. Estimation 1 (Table 1) shows that if the scope of the channel is *regional* (i.e., if the audience data corresponds only to Asturias or Basque Country regions) the *share* of the stage increases about 26%. This outcome is as expected, because both regions are probably those with the highest cycling tradition in Spain. Both have their own professional regional races (Tour of Asturias and Tour of Basque Country) and the most followed stages from the *Vuelta* of Spain are held in Asturias²⁰. Therefore, relative TV audience is expected to be higher in both regions compared to the rest of Spain. As far as the *viewers'* equation is concerned (Table 2), as the dependent variable (the natural logarithm of the average *number of viewers*) depends upon the region size, then a set of variables identifying the size of potential audience (i.e., the region) has to be included in the equation. These variables are *ETB regional channel*, *TPA regional channel* and *La2 regional scope* (the reference category is *La2 national scope*). As expected, the *number of viewers* strong diminishes when the channel have a regional scope compared with the total audience for a national channel.

As for scheduling of rival channels, estimations cannot identify, in general, any competitor program which strongly conditions the audience of cycling, maybe due to the very specific time slot assigned to cycling races (it is not prime-time and TV programs for this slot are in general low quality).

Finally, time dummies seem to show that TV audience was significantly lower in 2010, being this fact difficult to explain (Spanish riders competed for major races in 2010 and only at the end of the season there was a doping scandal, the Alberto Contador affair, that should not have had any influence on past TV audience ratings)²¹. In any case, estimations do not reveal a progressive decline in cycling TV audiences over time.

Conclusions

This paper shows that potential audience ratings for professional cycling in Spain depend mainly on the following features: competitive balance, type of stage and

race, nationality of the leader and calendar. So, *share*, *rating* and *number of viewers* variables increase as the competition is more balanced, when the stage is mountainous, when the leader is Spanish and when the race is scheduled at the weekend. Significant effects for inertial behaviors of viewers and for the region in which they are living have also been detected. These outcomes could help TV channels to set market prices for advertising time during cycling races, and, at the same time, help advertisers to find the best moments to focus their expenditures. On the other hand, organizers of cycling events (which are private firms) could use this information to schedule more efficient races, in the sense of maximizing audience ratings, and therefore, profits.

Notes

1. UCI means International Cycling Union. As the UCI states in its web site, “the UCI World Tour brings together the world’s greatest road races... The quality of the sporting show is guaranteed thanks to the participation of the best teams – and therefore the best riders – in all the UCI World Tour events. The 18 UCI Pro Teams... will participate in all the events on this calendar (the organizers retain the right to invite UCI Professional Continental Teams of their choice according to the number of places still available). Three rankings (individual, teams and nations) are calculated at the end of each UCI World Tour event” (<http://www.uciprotour.com>).

2. In year 2000, there were four first category cycling teams in Spain (*Banesto*, *Kelme*, *Once* and *Vitalicio*), and three second category teams (*Relax*, *Euskaltel* and *Costa Almería*). In 2011 there are only two teams in the first category, now called UCI Pro Tour (*Movistar* and *Euskaltel*), three teams in the second category (named Professional Continental – *Andalucía*, *Caja Rural* and *Geox*) and two teams in the third category (named Continental – *Burgos* and *Orbea*).

3. Other interesting papers are those by Pacey and Wickham (1985) and Hausman and Leonard (1997).

4. This result is in contrast with the live attendance to the stadiums, where the derbies have generally a greater attendance.

5. Kantar Media provides viewers with a special remote control easy to handle to do this.

6. As Kanazawa and Funk (2001) state, one criticism to this kind of ratings “is that they do not reflect viewing outside of the home, such in bars and college dormitories, where the incidence of sports viewing may be higher” (p. 600, Note 4). It may be a serious problem in Spain, where many people usually watch sport TV programs in bars, restaurants, etc.

7. Between 2005 and 2008 this ranking was named UCI Pro Tour Ranking, and from 2009 onwards it was called UCI World Tour Ranking. In 2008 the number of races included in the ranking drop dramatically (for example, *Vuelta*, *Giro* and *Tour* were excluded). But to build the quality indicators the key point is not the total number of UCI points held by the rider, but the points difference between two certain riders, and this difference is quite stable over the period of analysis.

8. This difference is computed at the end of the previous stage because these positions (leader and second classified) do not change until the end of the current stage (only when the stage is finished, the overall standing changes).

9. See, Table A.1 of Appendix to find the exact definition of all the variables.

10. We test other variables as proxies for competitive balance, as, for example, the time difference between the leader and the second classified in the overall standings, but this variable was not significant in the estimations. These types of variables are usually very significant. For instance, Carney and Fenn (2004) use differences in scores for NFL football games, finding that “closer scores attract more viewers” (p. 16).

11. “Classic” races, such as *Paris-Roubaix*, *Tour of Flanders*, *Milano-San Remo...*, are not so interesting for Spanish fans, although these races are likely to be the most attractive for Belgian or French supporters.

12. See, for example, Kanazawa and Funk (2001), p. 602.

13. As Kanazawa and Funk (2001) states, “games may enjoy higher ratings due to viewer spillover when preceded by shows enjoying larger viewership” (p. 602).

14. Major channels which are considered in this paper are: TVE1, La2, *Antena 3*, *La Cuatro*, *Telecinco*, and *La Sexta*. Moreover, two regional channels for which we have audience data were included, ETB and TPA.

15. *Operación Puerto* affair resulted in penalties for some well-known riders, such as Ivan Basso (winner of the *Giro*), Jan Ulrich (winner of the Tour) or Alejandro Valverde (winner of the *Vuelta*), and also for two of the most important Spanish team managers.

16. Sample size is lesser in the estimation of viewers due to variables *leader-second place UCI points difference* and *leader-third place UCI points difference* take values zero in some cases, and then their natural logarithm generates a missing value for the estimation.

17. For *share* and *rating* equations, dependent variables are defined as percentages, and the estimated coefficients have not a direct interpretation as elasticities. Therefore, they must be computed.

18. As Paul and Weinbach (2007) states for the National Football League (NFL), “fans prefer close games between quality teams”. It seems to be true also for cycling.

19. This variable is not defined in natural logs because the number of changes in leader until the previous stage for the first stage of a race is necessarily zero, and then many

observations were missing. For the estimation of *viewers* (Table 2), the elasticity of the number of *viewers* with respect to this variable is 0.17. As for the estimations of *share* and *rating*, this elasticity is 0.12 and 0.14, respectively.

20. For example, the success of the stage that finished at the *Covadonga Lakes* (Asturias) for the first time in 1983 gives place to the renaissance of the interest of Spanish media and people for cycling, after several years of forgetfulness (at the end of the 70,s and the beginning of the 80,s). Recently, the inclusion of a new stage finishing at the *Angliru* mountain pass in 1999 (also in Asturias) was a new boost for the race.

21. It is possible that this effect is related to the onset of Digital Television broadcasts, which contributed to the emergence of small TV channels, some of which have broadcast cycling races simultaneously (such as the *Giro* 2010, in the case of *Veo7* channel).

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Appendix. Variable definitions and descriptive statistics

Table A1: Variable definitions

Dependent variables	
Share	Percentage of viewers who watched the race in relation to the total number of viewers that were watching the TV at that time (minute audience shares are averaged across the stage's duration to compute the share of the entire program)
Rating	Percentage of viewers who watched the race in relation to the total population, national or regional population depending on the scope of the channel (minute audience ratings are averaged across the stage's duration to compute the rating of the entire program)
Ln (Viewers)	Natural logarithm of the total number of viewers who watched the race (minute audiences are averaged across the stage's duration to compute the number of viewers of the entire program)
Independent variables	
<i>Competitive balance</i>	
Leader-second place UCI points difference	UCI points (from UCI World Tour Ranking) held at the end of the former season by the rider who led the overall standings at the end of the previous stage (or at the end of the final stage held the previous year if it is the first stage of a stage race) or who won the previous race in the case of one-day races, minus UCI points held by the second classified
Leader-third place UCI points difference	UCI points (from UCI World Tour Ranking) held at the end of the former season by the rider who led the overall standings at the end of the previous stage (or at the end of the final stage held the previous year if it is the first stage of a stage race) or who won the previous race in the case of one-day races, minus UCI points held by the third classified
Number of changes in leader	Number of changes in leader until the previous stage (this variable takes value zero for one-day races and for the first stage of stage races)
<i>Type of stage</i>	
Mountain	Dummy variable taking value 1 if it was a mountain or medium mountain stage and 0 otherwise
Flat	Dummy variable taking value 1 if it was a flat stage and 0 otherwise
Time-trial	Dummy variable taking value 1 if it was an individual or team time-trial stage and 0 otherwise
<i>Long stage races</i>	
Vuelta of Spain	Dummy variable taking value 1 if the stage belongs to the <i>Vuelta</i> of Spain and 0 otherwise
Giro of Italy	Dummy variable taking value 1 if the stage belongs to the <i>Giro</i> of Italy and 0 otherwise
Tour of France	Dummy variable taking value 1 if the stage belongs to the <i>Tour</i> of France and 0 otherwise
Other races	Dummy variable taking value 1 if the stage belongs to other races different from <i>Vuelta</i> , <i>Giro</i> and <i>Tour</i> or they are one-day races and 0 otherwise (other races are Amstel Gold Race, Classic of San Sebastián, Dauphine, Lombardia, Flèche Wallonne, Liège-Bastogne-Liège, Milano-San Remo, Tour of Basque Country, Paris-Nice, Paris-Roubaix, Tirreno-Adriatico, Tour of Flanders, Tour of Romandie, Tour of Asturias, Classic of Naranco, Tour

	of Burgos, Tour of Castilla-León, and Tour of Swiss)
<i>Leader nationality</i>	
Spanish	Dummy variable taking value 1 if the leader at the end of the previous stage/race (at the end of the final stage held the previous year if it is the first stage of a stage race) was Spanish and 0 otherwise
<i>Calendar</i>	
Weekend	Dummy variable taking value 1 if the race was held on Saturday or Sunday and 0 otherwise
<i>Variables of inertia</i>	
Share of previous program	Percentage of viewers who watched the previous TV program in relation to the total number of viewers that were watching the TV at that time
Share of previous stage	Percentage of viewers who watched the previous stage (the final stage held the former year if it is the first stage of a stage race) or the previous race if it is a one-day race in relation to the total number of viewers that were watching the TV at that time
Rating of previous program	Percentage of viewers who watched the previous TV program in relation to the total population
Rating of previous stage	Percentage of viewers who watched the previous stage (the final stage held the former year if it is the first stage of a stage race) or the previous race if it is a one-day race in relation to the total population
Ln (Viewers of previous program)	Natural logarithm of the number of viewers who watched the previous program
Ln (Viewers of previous stage)	Natural logarithm of the number of viewers who watched the previous stage (the final stage held the former year if it is the first stage of a stage race) or the previous race if it is a one-day race
<i>Scope of TV channel</i>	
Regional	Dummy variable taking value 1 if the race was broadcast by a regional channel (ETB, TPA or La2 regional scope) and 0 if it was broadcast by La2 nationwide
ETB regional channel	Dummy variable taking value 1 if the race was broadcast by ETB (Basque Country regional channel) and 0 otherwise
TPA regional channel	Dummy variable taking value 1 if the race was broadcast by TPA (Asturias regional channel) and 0 otherwise
La2 regional scope	Dummy variable taking value 1 if the race was broadcast by La2 only for Asturias region and 0 otherwise
La2 national scope	Dummy variable taking value 1 if the race was broadcast by La2 nationwide and 0 otherwise
<i>Scheduling of rival channels</i>	
Film	Dummy variable taking value 1 if any other big channel is broadcasting a film at the same time and 0 otherwise
Series	Dummy variable taking value 1 if any other big channel is broadcasting a series at the same time and 0 otherwise

Magazine	Dummy variable taking value 1 if any other big channel is broadcasting a magazine at the same time and 0 otherwise
Newsletter	Dummy variable taking value 1 if any other big channel is broadcasting a newsletter at the same time and 0 otherwise
Quiz	Dummy variable taking value 1 if any other big channel is broadcasting a quiz at the same time and 0 otherwise
Documentary	Dummy variable taking value 1 if any other big channel is broadcasting a documentary at the same time and 0 otherwise
Other sport	Dummy variable taking value 1 if any other big channel is broadcasting other sport at the same time and 0 otherwise
<i>Time dummies</i>	
Year 2007	Dummy variable taking value 1 if the race was held in 2007 and 0 otherwise
Year 2008	Dummy variable taking value 1 if the race was held in 2008 and 0 otherwise
Year 2009	Dummy variable taking value 1 if the race was held in 2009 and 0 otherwise
Year 2010	Dummy variable taking value 1 if the race was held in 2010 and 0 otherwise
Year 2011	Dummy variable taking value 1 if the race was held in 2011 and 0 otherwise

Table A2. Descriptive statistics

	<i>Mean</i>	<i>St. dev.</i>	<i>Min.</i>	<i>Max.</i>
<i>Dependent variables</i>				
Share	6.417	4.262	0.600	24.600
Rating	1.576	0.991	0.100	5.900
Viewers (Thousands)	210.521	405.487	2.178	2,446.365
Ln (Viewers)	3.744	1.658	0.779	7.802
<i>Independent variables</i>				
<i>Competitive balance</i>				
Leader-second place UCI points difference	106.324	129.267	0	527.000
Ln (Leader-second place UCI points	4.126	1.344	0	6.267
Leader-third place UCI points difference	97.191	113.826	0	526
Ln (Leader-third place UCI points difference)	4.061	1.390	0	6.265
Number of changes in leader	2.926	2.394	0	9
<i>Type of stage</i>				
Mountain	0.402	0.491	0	1
Flat	0.469	0.500	0	1
Time trial	0.129	0.336	0	1
<i>Long stage races</i>				
Vuelta of Spain	0.164	0.371	0	1
Giro of Italy	0.164	0.371	0	1
Tour of France	0.246	0.432	0	1
Other races	0.426	0.495	0	1
<i>Leader nationality</i>				
Spanish	0.387	0.488	0	1
<i>Calendar</i>				
Weekend	0.406	0.492	0	1
<i>Variables of inertia</i>				
Share of previous program	4.957	4.480	0.050	22.900
Share of previous stage	6.527	4.315	0.600	24.600
Rating of previous program	1.276	1.216	0.020	5.700
Rating of previous stage	1.603	1.005	0.100	5.900
Viewers of previous program	213.475	485.882	0.436	2,630.996
Ln (Viewers of previous program)	3.068	2.147	-0.831	7.875
Viewers of previous stage	214.475	413.111	2.178	2,446.365
Ln (Viewers of previous stage)	3.760	1.660	0.779	7.802
<i>Scope of TV channel</i>				
Regional	0.785	0.411	0	1
ETB regional channel	0.445	0.497	0	1
TPA regional channel	0.199	0.400	0	1
La2 regional scope	0.141	0.348	0	1
La2 national scope	0.220	0.411	0	1
<i>Scheduling of rival channels</i>				
Film	0.656	0.476	0	1
Series	0.828	0.378	0	1
Magazine	0.785	0.412	0	1
Newsletter	0.566	0.497	0	1
Quiz	0.543	0.499	0	1
Documentary	0.605	0.490	0	1
Other sport	0.387	0.488	0	1
<i>Time dummies</i>				
Year 2007	0.035	0.184	0	1
Year 2008	0.207	0.406	0	1

Year 2009	0.297	0.458	0	1
Year 2010	0.418	0.494	0	1
Year 2011	0.043	0.203	0	1
Number of observations	256			