Predicting TV Audience of International Sporting Events in Korea: The Case of 2006 FIFA World Cup

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Abstract

In this paper, we use the Korean viewership data for the 2006 FIFA World Cup games to establish a model to predict the TV ratings of big international sporting events. We focus on the ex ante determinants of viewership that can be taken into consideration by the time the TV commercial air time is sold. The results show that the TV ratings of each game can be predicted very accurately in a simple model employing several predetermined variables. The participation of the national team is the single most important factor, adding a whopping 47 percentage points to the viewership on average. The local time of the day for a live broadcast is the next most important factor.

Keywords : Sporting Events; TV Ratings; FIFA World Cup

JEL classification : L82; L83

1   Introduction

The TV ratings of big sporting events such as the FIFA World Cup or the Olympic Games are a critical determinant of advertisement revenues, which again dictates how much broadcasting companies are willing to bid for the right to cover the events. The sponsoring companies that purchase air time for their TV commercials again base their purchase decision on the expectation of the viewership. For some major sporting events like the U.S. Super Bowl, it is relatively easy to predict the TV viewership since it is held only once a year on a regular basis. The event date and time are almost the same every year. Except for the finalists, all other conditions are similar, too. As a result, the TV rating is expected to be similar to that of past years. The viewership for the baseball World Series games is also highly predictable, though not as much as for the Super Bowl due to the different contingencies in the unfolding of the series.

For sporting events in which many games take place in a relatively short period of time, such as the Olympic Games and FIFA World Cup, it is much more difficult to predict the TV rating of each game. Their broadcast time and contestants vary every time. Further, they often take place in a far-off place, affecting the time of the day in which the games can be broadcast live for the domestic audience. When the summer Olympic Games are held in a European country, it is inevitable that some games are held at times inconvenient or even near-impossible for Asian or American audiences to watch. The identities of the contestants also affect the viewership. The games involving the national team dominate other games in viewership, especially when the sport itself is highly popular in the country. However, the advancement of the national team is hard to predict.

All these considerations make it very difficult to determine the prices of the air time for TV commercials. In this paper, we use the Korean viewership data for the 2006 FIFA World Cup games to establish a model to predict the TV ratings of big international sporting events. In 2006, the Korean national soccer team participated in the finals but failed to advance to the knockout stage of the tournament. Due to the big time lag between Germany, the hosting country, and Korea, many of the games took place after midnight or before dawn in Korean time. These various circumstances of the games give us a rich opportunity to test the effects of different factors on TV ratings. The Soccer World Cup has an advantage over the Olympic Games for our purpose in that it has only one kind of game, soccer. It means that we do not need to compare, for example, water polo and gymnastics, which are very different from each other in general popularity and national interests.

Soccer is arguably one of the most popular sports in the world, and also in Korea. Coming right after the very successful hosting of the 2002 Korea-Japan

World Cup in which the Korean team surprised the world by advancing to the semifinal, the 2006 World Cup games were greatly anticipated in Korea. Many of the 2002 national team members were still in the team, encouraging high hopes for another good performance. Moreover, the general interest in soccer itself had increased significantly, especially among young females.

We focus on the ex ante determinants of viewership that can be taken into consideration by the time the TV commercial air time is sold. So, the time and day of the broadcasting are included in the analyses. For the first stage games in which the contestants are known in advance, the information about the teams is included. Ex post information about the games, such as the scores, is not included. The results show that the TV ratings of each game can be predicted very accurately in a simple model employing several predetermined variables. The participation of the national team is the single most important factor, adding a whopping 47 percentage points to the viewership on average. The local time of the day for a live broadcast is the next most important factor: prime time games command more than a 27 percentage point advantage over games shown at 03:00 or 04:00 in the morning. For the games shown right after midnight, this advantage is about 8 percentage points. The games in the second stage of the knockout tournament were significantly more popular but the difference is less than 5 percentage points, which became greater when they were shown at prime times. Having other kind of programs or other soccer games on other important channels has significant negative effects. Some variables are remarkable for not having any significant effects contrary to general expectations. The semi-finals and the final game did not have extra effects on viewership. Nor did the FIFA ranking of the teams in the game. Most of the interactive terms of time of the day, game importance, and the weekend variables had insignificant effects. As a result, a simple and practical regression model with only 7 to 8 factors can explain almost as much as much more complicated models with many more variables. The adjusted R^2 is as high as 0.87.

There are many previous research papers about the TV audiences of sporting events. Rodriguez et al (2011) investigated the determinants of the TV audience for professional cycling in Spain. They found that the competitive balance, the stage of the race, the nationality of the race leader, and the calendar are the important factors. Garcia and Rodriguez (2006) looked into the Spanish professional football league for the determinants of the TV audience. They found that ex ante attractiveness of the match is the main determinant. Borland and MacDonald (2003) provide a broad survey of the literature on the demand for professional sports. They include research on live attendance, sponsorship, and merchandizing as well as TV audience.

The remainder of the paper is organized as in the following. Chapter 2 provides the details of the 2006 FIFA World Cup Germany and its broadcasting in Korea. In Chapter 3, we present the empirical methodology and the

results, and conclude the paper in Chapter 4.

2   2006 FIFA World Cup Germany and Korean TV Audience

2.1   The Games

The 2006 FIFA World Cup was held in Germany during the period of June 10 to July 10. Thirty two national teams participated, and South Korea was one of the four countries from Asia. Europe was the area represented by the most teams with fourteen, followed by South America and Africa with five teams each. In the first stage of the games, the thirty two teams were divided into eight groups, each including four teams. In each group, every team competed with each other for a total of six games. The best two teams in each group advanced to the second stage. So, there were in all 48 games in the first stage, which lasted for the first 15 days.

The second stage was a knockout tournament among the 16 teams that survived the first stage. Including the extra game to determine 3rd place, there were 16 games in a period of 15 days. In the first stage, three to four games were held per day on average, but fewer games were held per day in the second stage as the tournament progressed toward the end. In the semifinal and final stages, only one game was held per day. All four semi-finalists were European countries (Germany, Italy, Portugal, and France), of which Italy and France advanced to the final. In the final game, the score was 1:1 after the extended game, and Italy won the championship in a penalty shoot-out.

The South Korean team was included in Group G, together with France, Switzerland, and Togo. After one win against Togo, one draw with France and one loss to Switzerland, it failed to advance to the second stage, significantly cooling the soccer fever in Korea thereafter.

2.2   TV Broadcasting in Korea

All three Korean network TV broadcasting companies participated in broadcasting the World Cup games.[3] The state owned KBS has two channels, KBS1 and KBS2.[4] They covered 14 and 47 games, respectively. Two private companies, MBC and SBS, each with one channel, covered 53 games

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[3]The three companies participated in the bidding for the broadcasting right as a consortium and shared the cost.

[4]KBS is a state-owned non-profit enterprise. Of the two channels it owns, KBS1 channel does not sell commercial air time.

each. All 64 games were broadcast, but three of them were shown pre-recorded. Since there is a 7 hours time lag between Germany and Korea, many of the games were held after midnight in Korea, making it very difficult to watch them live. Out of 64 games, 29 games were held at 3:00 or 4:00 AM (Dawn, henceforth), the worst time to watch soccer. 17 games were held at midnight or 1:00 AM (Midnight, henceforth), and only 18 games were held at 22:00 or 23:00 PM (Prime time, henceforth). But since Korea is located far away from both Europe and America, this kind of inconvenience occurs commonly in most major international sporting events. The 2006 World Cup was not an exception.

As can be guessed by the number of games covered by the three broadcasting companies, many games were shown by more than one channel, often by all three, especially the popular games involving the Korean national team. In such games, those who did not have cable TV subscription had no or few alternatives for watching other programs. Sometimes, two games were held at the same time, and the channels were split between them.[5]

Table 1 shows the TV ratings of the 61 live games. For the sake of convenience and simplicity, the games were divided into three classes:

- Class 1 (G1): The games involving the Korean national team (3 games).

- Class 2 (G2): The games in the second stage or the games in the first stage in Group G (in which the Korean team belonged) except those included in Class 1 (20 games).

- Class 3 (G3): The games in the first stage except those included in Class 1 or 2 (38 games).

There were three different broadcast times as mentioned before: Prime time (22:00, 23:00); Midnight (24:00, 01:00); and Dawn (03:00, 04:00).[6] It can be easily seen that there is an enormous gap between the games involving the Korean national team and others. For the only game involving the Korean team and shown at Prime time, the rating was a whopping 74.3 percent. Three out of four families watched the game that night. Even at the worst time of Dawn on a weekday, more than half of Korean families were awake cheering for the Korean national team. For other games, however, broadcast time mattered a lot. Very few watched the games at Dawn, but the games shown at Prime time commanded fairly high ratings.

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[5]It was usually the state owned KBS that chose the less popular games.

[6]The times are for start of the game.

Table 1: Summary of TV viewership of 2006 FIFA World Cup games

Time Slot	Day of the week	Group1		Group2		Group3		Total number of games
		Rating	Number of games	Rating	Number of games	Rating	Number of games	
PRIME Time (22,23 PM)	Weekday	74.3	1	54.0	1	28.7 (12.66)	6	8
	Weekend		0		0	25.4 (12.44)	7	7
Midnight (24,01 AM)	Weekday		0	16.8 (8.32)	4	11.4 (5.98)	5	9
	Weekend		0	22.3 (3.94)	4	11.8 (0.97)	4	8
Dawn (03,04 AM)	Weekday	54.2	1	8.1 (2.63)	6	4.1 (2.05)	9	16
	Weekend	53.5	1	6.9 (3.86)	5	4.8 (0.91)	7	13
Total number of games			3		20		38	61

Note: 1. The figures are the average of the total ratings (%) of the games in each category. Total rating means the sum of ratings of each game from all channels that broadcasted it. The figures in parentheses are standard deviations among different games in the same categories.

2. The table covers only 61 live games out of all 64.

3   Empirical methodology and the results

3.1   The empirical model

Our goal is to establish an econometric model to predict the viewership, upon which the value of the sponsorship for the games can be determined. Therefore, we should incorporate only ex ante information about the games. We use least square regressions in which the dependent variable is the total viewership of each game. As mentioned before, some games were broadcast by multiple channels simultaneously. In such cases, the total viewership means the sum of the ratings from all channels. The key explanatory variables are grouped in four categories as shown below:

1. The importance of the game

   G1: a dummy variable for Class 1 games

   G2: a dummy variable for Class 2 games

   (The baseline is all other games (Class 3).)

2. The time of the game

   PR: a dummy variable for the games shown at Prime time

   MN: a dummy variable for the games shown at Midnight

   (The baseline is the games starting at 3:00 or 4:00 oclock in the morning)

3. The day of the game

   WE: a dummy variable for the games held on a weekend

4. Audience alternatives

   PR_OTH: a dummy variable for the games held at Prime time but not broadcast by all three network channels.

   GM_OTH: a dummy variable for the games shown at the same time as other games which occupied more channels.

The audience alternative variables are not entirely exogenous in that the expected viewership affects the broadcasting companies decision on how to assign the channels. However, they do not suffer from the endogeneity problem since the realized viewership cannot affect these decisions ex post. The variables in the first three categories are almost perfectly independent from each other, and so they can be interacted freely. Eight interactive variables out of the three categories of variables are possible: G1xPR, G1xMN, G2xPR, G2xMN, G1xWE, G2xWE, WExPR, WExMN. In addition, four triple interactive terms are possible: G1xPRxWE, G1xMNxWE, G2xPRxWE, G2xMNxWE. However, except G2xMNxWE, none of the triple interactive terms had any matching games. For instance, no Class 1 game was held at Prime time on a weekend.

3.2   Results

Model 1 in Table 2 shows the result of an estimation including all the possible variables. Only a few of the variables have significant effects on the viewership. The national team games command absolute importance, adding 48.7 percentage points in the rating over Class 3 games. Class 2 games, however,

enjoyed only insignificant addition in viewership, implying that the biggest factor in TV viewership is the interest in the performance of the national team, rather than soccer playing itself. The fact that the Korean team did not advance to the second stage of the knockout tournament would have contributed to the lack of interest in Class 2 games.

The playing time is the next most important factor. The games held in the Prime time zone were more popular than the games held after midnight by more than 20 percentage points. The timing effect was especially great for Class 2 games, suggesting that viewers preferred watching important games if they were held at Prime time. A Class 2 game held at Prime time on a weekend commanded about 45 percentage points more viewership than a Class 3 game held at 3 or 4 oclock in the morning.

The games that were not simultaneously shown by all three major networks had significantly less viewership. When other networks aired a non-soccer program, the viewership was 16 percentage points lower. Again, this difference reflects the broadcasting companies anticipation that the game would not be popular enough to merit all three channels of the network companies, rather than other programs pulling audiences away from soccer. When two games were shown at the same time, the less important game suffered 6.5 percentage point loss in viewership.

Model 2 excludes the variables with no or insignificant effects on the dependent variable in Model 1. Most of the interactive terms are dropped except G2xPR. As a result, the number of explanatory variables decreases from 14 to 6. Still, the decrease in R2 is minimal, and adjusted R2 actually increases. The remaining variables retain their significance and the changes in the estimated coefficients are small.

Table 2: Estimation of TV viewership of 2006 FIFA World Cup games

Variables	Model1	Model2
Intercept	5.51	4.59
	(2.81)	(3.59)
G1	48.68	46.81
	(8.31)	(14.03)
G2	2.59	4.75
	(0.87)	(2.86)
WE	-0.74	
	(-0.26)	
PR	25.86	27.77
	(8.44)	(12.62)
MN	5.88	8.48
	(1.87)	(4.94)
G1 x PR	-5.76	
	(-0.69)	
G1 x MN		
G2 x PR	20.02	16.88
	(2.99)	(2.82)
G2 x MN	2.80	
	(0.59)	
G1 x WE	0.04	
	(0.01)	
G2 x WE	0.79	
	(0.18)	
WE x PR	4.99	
	(1.12)	
WE x MN	1.09	
	(0.23)	
G1 x PR x WE		
G1 x MN x WE		
G2 x PR x WE		
G2 x MN x WE	4.32	
	(0.61)	
PR_OTH	-16.19	-13.85
	(-4.63)	(-4.44)
GM_OTH	-6.53	-6.13
	(-2.10)	(-2.09)
Nobs	61	61
R2	0.91	0.89
Adj R2	0.88	0.88

Note: The figures in parentheses are t-values.

3.3   Other variables

Out of the 60 plus games, some games obviously carry more weight than others even when they do not involve the national team. Among them are the semi-finals and the final. But even in the early stage, the games involving the traditional powerhouses, such as Brazil, Italy, France, and Argentina drew feverish attention among soccer fans. Since the contestants of the first stage games are predetermined, we can incorporate this information in predicting the TV ratings at least for Class 3 games, and for the games beyond the semi-final stage.

Table 3 shows the results of the estimation models incorporating these additional variables in Model 2. The additional variables are as follows.

Semi: a dummy variable for the games on or beyond the semi-final stage.
Rank1: the higher number of the FIFA rankings of the contestants
Rank2: the sum of the FIFA rankings of the contestants in a game

Rank1 and Rank2 are used alternatively. Rank1 is to see the effect of a very strong team on the viewership, while Rank2 considers the strength of both teams in the game. Models 3-5 show the estimation results involving these variables in various combinations. In all three models with alternative inclusions, none of the above three variables has any significant effect. It is rather surprising that participation of strong teams does not affect the viewership. The viewers seem to watch whatever game is on air at a convenient time and not to care too much about the content of the game itself. Or, the two variables, PR_OTH and GM_OTH may already reflect the effects of the participant reputation so that the Rank variables do not exert any additional effect.

Even more surprising is the fact that the (semi) finals are not any different from the first stage games. This result is quite contrary to the general perception that people are excited about which team wins the trophy; is Brazil going to grab another win this time or is it going to be a European team? etc. One possible explanation is that by the time the final games are held, viewers have accumulated some kind of fatigue from watching too much soccer. The World Cup continues for a month, which is a long time for many viewers of average enthusiasm about soccer. By the time of the semi-finals stage, the initial excitement may have worn off, and people may want to do other things that they had put off to watch the soccer.

Table 3: Estimation of TV viewership of 2006 FIFA World Cup games (extra variables).

Variables	Model3	Model4	Model5
Intercept	4.6	4.7	3.1
	(3.5)	(2.8)	(1.3)
G1	46.8	46.7	48.2
	(13.9)	(13.1)	(12.3)
G2	4.8	4.6	6.4
	(2.6)	(2.1)	(2.2)
PR	27.8	27.8	27.8
	(12.5)	(12.3)	(12.4)
MN	8.5	8.5	8.3
	(4.7)	(4.6)	(4.5)
G2 x PR	16.9	16.9	16.7
	(2.8)	(2.8)	(2.7)
Semi	0.0	0.0	-0.2
	(0.0)	(0.0)	(-0.1)
G3 x Rank1		-0.0	
		(-0.1)	
G3 x Rank2			0.0
			(0.7)
PR_OTH	-13.9	-13.9	-13.9
	(-4.4)	(-4.4)	(-4.4)
GM_OTH	-6.1	-5.9	-7.1
	(-2.1)	(-1.6)	(-2.2)
Nobs	61	61	61
R2	0.89	0.89	0.89
Adj R2	0.87	0.87	0.87

Note: The figures in parentheses are t-values.

4   Concluding remarks

Our results suggest that prediction of the TV viewership for a group of big sporting events would better be based on simple models including such basic factors as the participation of the national team, viewing times within the day and viewer alternatives. Most of the interactive terms of the basic factors have insignificant effects. The national team is an absolutely dominating factor, while the weight of other teams is not important at all. The last stage games, i.e. semifinals and final, do not seem to command as much popularity as is generally expected, probably the outcome of diminishing marginal utility of watching sporting events in a relatively short period of time.

The simplest model with only 7 explanatory variables of significant effects on the viewership has almost as much explanatory power as other models with

more than twice as many variables. The adjusted R^2 is the highest with the simple model. This simple model should prove useful in determining the value of each game in terms of TV advertisement. Whether the price of the air time is determined in biddings or administratively, the decision should be based on the prediction of the viewership. In Korea, air time prices were determined by a highly complex formula which included most of the variables considered in our estimation and their interactions. However, it turned out that the prices did not closely match the actual viewership, with some games undervalued and others overvalued. A formula based on our results would be simpler and more accurate.

The World Cup is unique in that it is comprised of only one kind of game, namely soccer, and still commands the highest viewership around the world. But some of our results may be applicable to other big sporting events like the Olympic Games. Especially the importance of viewing time within the day and the effect of diminishing interest in the games should apply to other big sporting events.

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