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Potential Baseball Fan Engagement: The Determinants of a New Television Audience in the Chinese Professional Baseball League during the COVID-19 Pandemic

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Abstract: The COVID-19 pandemic has led to a dramatic increase in baseball viewership, thereby providing an opportunity to comprehensively explore the determinants of the new audience. To this end, we analyze the preferences of the Taiwanese audience in 2019 and 2020, both before and after the COVID-19 outbreak, through TV ratings based on the effect of outcome uncertainty, tournament factors, consumer availability, and game quality. The empirical findings show that the behavior of the small-scale Chinese Professional Baseball League (CPBL) sports television viewing market differs from that of large-scale markets such as Major League Baseball. Additionally, the effect of the outcome uncertainty of the game is inconsistent before and after the COVID-19 pandemic. New audiences, unlike existing audiences, have been affected by team quality and consumer availability that are statistically significant, but tournament factors are not significant. This study provides the first empirical analysis of the factors driving TV ratings of CPBL games as well as the impact before and after the COVID-19 outbreak as a contribution to filling the gap in sports communication research. The observations can be used by strategic departments of professional teams for their marketing target, to identify potential fans, and to direct their marketing resources towards sustaining or even growing during the pandemic events.

Keywords: audience demand; television viewership; outcome uncertainty; professional sports market



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1. Introduction

The motivation of sports fans has been extensively studied by taking issues such as escape, entertainment, family, self-esteem, group affiliation, and eustress into consideration [1]. However, sports fans were once not fans, and they become supporters of a particular team for different reasons. Before becoming fans, people usually undergo a period when they will watch games without having too much of a standard fan's reaction; e.g., an emotional reaction for the supported team's win or loss. People who watch sports events without a strong emotional connection or loyalty are categorized as sports spectators. Ref. [2] defined people who watched sports games in person or through TV and other means of media as sports spectators. Ref. [3] also provided a similar definition. Sports spectators are potential fans, and thus, comprise a good marketing target group. However, researchers have rarely attempted to determine what spectators' interests are and how their interests differ from those of fans.

In early 2020, despite the outbreak of COVID-19 worldwide, Taiwan managed to keep the virus out, but there were many disruptions to daily life. In February 2020, restrictions on entry into Taiwan from abroad were tightened and the start of the school year was delayed by two weeks due to the outbreak. Those who have any contact with the infected person should be quarantined at home for several days and should not go out. Many large-scale events that gather crowds, such as the annual folk religious ceremony, the Dajia

Mazu Pilgrimage, were suspended. Except for the mandatory requirement to wear a mask, keep social distance, and overseas travel restrictions, people in Taiwan lived their lives as usual in 2020. However, fear of infection has left many tourist attractions, entertainment venues, and restaurants deserted, forcing their staff to shut down.

On 12 April 2020, the Chinese Professional Baseball League (CPBL) located in Taiwan was the first professional baseball league worldwide to begin its season [4], although it was originally supposed to start in March. At the time, sports leagues and important competitions had either been put on hold, rescheduled, or completely canceled. The CPBL first held 33 closed-door baseball games without spectators, then opened each game to 1000 spectators on 5 May 2020, then increased to 2000 spectators on 15 May 2020, and finally relaxed the attendance to 78% capacity on 23 July 2020 until the season ended on 30 October 2020 with 240 games played.

As of 2020, the CPBL and the Super Basketball League (SBL) are the only two domestic professional sports leagues in Taiwan that are televised on cable. Generally, the SBL season runs from December to April of the following year, and the CPBL runs from March to September. The broadcasts of Major League Baseball (MLB) and National Basketball Association (NBA) games in North America are also very popular in Taiwan. Despite the popularity of other sports, such as basketball, baseball is often regarded as the national sport of Taiwan [5]. In the 2019 season, which immediately preceded the COVID-19 pandemic, total CPBL attendance was nearly 1.4 million fans attending a total of 240 matches, with an average attendance of 5826, an increase of nearly 7% from 2018 [6]. In the 2020 season, which was plagued by COVID-19, the average attendance dropped to 3573 [7]. Ref. [8] reported the domestic TV ratings of each team for the 2019 and 2020 seasons. CPBL is composed of four teams: the CTBC Brothers, the Uni-President 7-Eleven Lions, the Rakuten Monkeys (known as Lamigo Monkeys until 2019), and the Fubon Guardians. The Fubon Guardians' cable TV share ranged from 0.12 to 0.19; the Rakuten Monkeys' and CTBC Brothers' shares ranged from 0.24 to 0.80. The United Presidential Lions drew similar numbers. For the 2020 season, month-to-month ratings were up in April to July for every team, and in many cases by as much as 100 percent.

In this study, we calculated the TV rating model for both years and compared the models for 2019 and 2020. Differences before and after the outbreak were identified. During the period when sports events were closed to the public due to the pandemic, the attention of ticket-buying fans generally shifted to television broadcasting, digital platforms, and social media. This change led to a multiplication of growth across television viewership and social and digital media platforms [9]. The difference between the number of television viewers was the number of spectators who turned their focus to baseball during the pandemic. These people were potential fans of the CPBL because they opted to watch baseball games over other programs during the COVID-19 period. Thus, analyzing the preferences of the group that started watching CPBL games after the outbreak of COVID-19 is important. This study provides insight into where the potential consumers of the TV sports market are and what factors influence their viewing by comparing the CPBL TV rating data for 2019 and 2020.

2. Literature Review

2.1. Sports Broadcast Viewing Preferences and Heterogeneity

With the evolution of technology, the way people participate in sports appreciation is becoming increasingly diversified. Sports viewing from the earliest live attendance gradually expanded to television broadcasts and Internet broadcasts, thus breaking through the limitations of geographic space and time. To understand the expanding nature and significance of the sports media market, viewership research has gained substantial attention [10–12]. Researchers have utilized TV ratings data to understand audience behavior, capture fan preferences for broadcast content characteristics prior to the game, determine factors that emerge during viewing [13,14], and identify the preferences of more diverse viewers located in individual regional media markets or in different countries. Existing studies have estimated

TV ratings models under various influence factors, while focusing on professional ball sports leagues, such as the MLB [15], NBA [16], and National Football League [17] in North America, football in Europe [18–20], and baseball in Asia [21–25].

These studies have also found that spectators who watch TV games are different from those who attend live games and have more heterogeneous preferences [26,27]. The contextual background setting and findings of such research are not consistent across countries, regions, and sports leagues. Factors that influence the demand of TV viewers for sports programming vary depending on the unique characteristics and culture of each sports league [28,29].

Professional sports are culturally dependent, and the socioeconomic environment surrounding each country's professional league may drive different factors that affect sports media consumption [29]. The CPBL is located in Taiwan, which has a total population of about 23 million. The history of its development goes back around 30 years. Until 2020, its scale was not large, with only four teams being watched on television. However, Taiwan's baseball has been ranked among the top five in the world by the World Baseball Softball Confederation for nearly a decade. During the COVID-19 pandemic, this viewing behavior in relation to small professional baseball leagues was less fragmented and could be used as a means of acquiring new viewers without considering the exclusionary effects of concurrent league games. Whether the behavior of this small-scale sports viewing market can be explained by the previous literature on viewing ratings models for large-scale markets such as MLB remains an empirical study.

2.2. Factors Affecting the Viewership of Sports Broadcasts

Research on sports broadcast ratings has been rooted in the study of live attendance, which explores the factors that influence live participation based on the demands of the audience. A number of factors that affect attendance have also been used in TV ratings studies to re-examine whether they affect the viewership of sports broadcasts. Most studies on viewership in recent years have used TV ratings as a proxy for the demand for live sports [30,31], and the factors that determine ratings are therefore related to audience demand. In previous studies, many different TV viewership models have been proposed for investigation. The viewing demand for televised games can be determined by the hedonic function, which is a function of expected game quality, actual game quality, temporal factors, and consumer availability [32]. In defining the viewership demand using a general demand function, ratings are a function of uncertainty or relative quality, absolute quality, other game characteristics, and economic characteristics [27]. From the point of view of consumer demand theory, viewership is proposed to be a function of anticipated characteristics, actual characteristics, temporal factors, substitutes, and market characteristics [16]. Although these studies give rise to different perspectives and use inconsistent terminology, the factors adopted in the constructed models are close to each other in terms of meaning.

The most common factor that could be considered with respect to audience demand is concerned with the effects of outcome uncertainty. The uncertainty of outcome hypothesis (UOH) predicts that consumer demand is positively correlated with the uncertainty of game outcomes [33], which is a fundamental theory linked to sports economics literature. The betting lines, which imply winning probabilities, are often included to proxy the degree of outcome uncertainty inherent in a game and to test support for the UOH.

In addition to the betting lines, the strength, performance, and ranking of the team are usually considered to be the nature of the dependent variable for testing the UOH. However, the variables utilized vary across sports and contexts, and multiple strains of evidence in the relevant literature are for and against the UOH. In some countries or localities, fans of a particular professional league prefer to closely watch competitive, unpredictable games [34,35] or games with higher expected scores [36]. Alternatively, some fans prefer to watch games with more certainty [32]. In addition, the presence of a superstar or more talented players on the team has a positive impact on ratings [37]. Some other factors that are less relevant to the UOH, including the home or away team in a local game [38,39], the

age of the teams, the time slot of the game [40], and the newness of the venue, are often adopted in the literature to provide empirical evidence for the effect on ratings.

3. Method

3.1. Empirical Model

To understand the changes in the spectator behavior of the CPBL both before and after the COVID-19 pandemic, we constructed a model of TV viewership as an instrument for the study. In line with the UOH and existing research estimating the determinants of television viewership and taking into account the cultural background and characteristics of the population in Taiwan, we specified the television ratings of the CPBL as a function of numerous factors, including expected game quality, pre-game team quality, tournament factors, consumer availability, and actual game quality.

We estimated the viewership of a given game using the following regression equation, where i and t represent the game and season, respectively.

$$\ln(\text{Rating}_{i,t}) = \beta_0 + \beta_1 \text{ClosingLine}_{i,t} + \beta_2 \text{ClosingTotal}_{i,t} + \beta_3 \text{WPSum}_{i,t} + \beta_4 \text{GBDiff}_{i,t} + \beta_5 \text{TeamMatchup}_{i,t} + \beta_6 \text{Field}_{i,t} + \beta_7 \text{Channel}_{i,t} + \beta_8 \text{Time}_{i,t} + \beta_9 \text{DayOfWeek}_{i,t} + \beta_{10} \text{ScoreDiff}_{i,t} + \beta_{11} \text{ScoreSum}_{i,t}. \quad (1)$$

Taking the natural logarithm of the ratings as the dependent variable increased the scale of variation and converted the values that were originally greater than zero into positive and negative values. Thus, the influence of the dependent variable was easier to detect. The dependent variables affecting the rating are described as follows.

ClosingLine and *ClosingTotal* were calculated on the basis of the odds set by the Taiwan lottery to predict the outcome of the game, representing expected game quality. *ClosingLine* is the absolute value after subtracting the closing money line bet odds of the two teams, while *ClosingTotal* is the sum of the points in the Over/Under bet. The smaller that the *ClosingLine* value is, the greater that the uncertainty of the match outcome will be. A higher *ClosingTotal* value indicates that the two teams will score more often and the game will be more exciting. However, it may also indicate that the difference in strength between the two teams is too great and may result in a lopsided situation with a low uncertainty regarding the outcome. In some studies, *ClosingLine* is given as the absolute value of the *ClosingLine* point spread [16] or is directly referred to as *ClosingSpread* [32,40]. However, the point spread of the CPBL in the Taiwan lottery is almost either +1.5 or −1.5, unlike in other professional baseball betting markets that are accompanied by a variety of different value possibilities.

WPSum refers to the sum of the two teams' win percentage. The win percentage is the number of wins a team has accumulated in the season up to the previous game divided by the total number of games played; a higher value means that the team is stronger. A high *WPSum* value means that a strong team is playing against another strong team. This variable represents the overall quality of the teams participating in the game. Assuming that fans prefer games between the best teams, this variable should have a positive impact on television ratings [40].

Another indication of the team quality is the Elo rating [16,27]. However, in the case of the CPBL, which is very small with only four teams, the Elo rating is not applicable and is not often relevant to the audience. The game behind, which also has a ranking connotation [11,41], appears more often in the CPBL as a proxy for pre-game team quality instead of the Elo rating. The game behind counts the number of teams tied with the observed team in the league standings based on the number of games behind the league leader. *GBDiff* is the absolute value of the game behind between the two teams in a match. The smaller the value, the more intense the rivalry between the two teams and the more likely it is to attract fans.

TeamMatchup, *Field*, and *Channel* are the tournament factors to be examined in this study. The most typical example of the impact of *TeamMatchup* on ratings is whether the game can be labeled as a derby or rivalry game [10,29]; i.e., a sports game between teams

in the same area. *TeamMatchup* is also related to the number of fans and the loyalty of each team. Since the CPBL only has four teams, and the region is not large, the city boundaries related to the team's home field effect are not evident. Thus, a consensus on whether it is a rivalry game is difficult to reach. Nevertheless, in this study, only six matchup combinations consisting of four teams were available, which was suitable for exploring the impact on TV ratings on a case-by-case basis. The CPBL teams were the CTBC Brothers, the Uni-President 7-Eleven Lions, the Rakuten Monkeys, and the Fubon Guardians, which were shortened to Brothers, Lions, Monkeys, and Guardians and labeled with the letters *B*, *L*, *M*, and *G*, respectively. The six matchups, regardless of whether the games were home or away, were labeled as *BL*, *BM*, *BG*, *LM*, *LG*, and *MG*.

Field is the venue for the tournament and was used in this study to compare the difference between the 2019 season when access was unrestricted and the 2020 season when access was restricted. The 2019 and 2020 seasons were played at four and six different stadiums, respectively. These venues are located around Taiwan and can be identified and labeled by the city in which they are located, including Taichung, Taoyuan, New Taipei, Tainan, Hualien, Taipei, and Kaohsiung.

Channel refers to the broadcast channel of the CPBL games on cable TV. Cable TV in Taiwan is chargeable, and almost every household has a subscription with a very high penetration rate. Although the number of viewers watching the CPBL game broadcasts on the Internet has been increasing in recent years, cable-based ratings are still sufficiently representative to reflect audience behavior during the outbreak. The channel varies from year to year depending on how the game is authorized to be broadcast. CPBL broadcast authorization for 2019 and 2020 was sold by each team for their home games. Brothers home games were broadcast by Videoland Sports Channel (VL Sports), Guardians home games were broadcast by MOMOTV, and Eleven Sports broadcast Monkeys home games. Lions home games were broadcast by Eleven Sports and MOMOTV. Thus, *Channel* was relevant to the tournament, and the ratings might have been influenced by the anchor's reporting style and the quality of program production.

Time and *DayOfWeek* represent consumer availability in the model. In general, weekend games and primetime from 19:00–21:45 are the most popular time slots for watching game broadcasts [27]. CPBL games are always broadcast live in the afternoon or evening, but sometimes the start time is changed due to heavy rain or a conflict between the game schedule and the previous program. In this study, the time was divided into three categories: *Afternoon* (13:00–15:00), *Evening* (16:00–17:59), and *Night* (18:00–20:00), based on the start time of the broadcast. *DayOfWeek* covers Sunday through Saturday. To be specific, the CPBL has no games on Monday, and one or two games may be simultaneously held in different venues. During the COVID-19 pandemic, some industries were closed, and TV viewership, which was originally a weekend leisure activity, became a leisure option during the week. Whether spectators who were planning to attend the games on weekends switched to watching TV broadcasts is worth exploring.

ScoreDiff and *ScoreSum* are the actual outcomes of the game, which are the final score difference and score sum of the two teams, respectively, and stand for the actual game quality. If the actual game quality is poor, audiences may stop watching or change the channel before the game is finished. Ratings are calculated as an average over the three- or four-hour broadcast period of the entire game. Thus, it will be affected.

A number of studies have examined match data in terms of home and away games, and have even constructed separate regression models for home and away viewership [27]. However, in Taiwan, where the CPBL is located, home and away games have sometimes not been clearly distinguished due to the particular geography, cultural background, and tournament system. Instead of separately considering the factors of the home team and the away team, the ratings model was therefore constructed by adding up the values of the factors of both home and away teams, or by taking the absolute value of the difference.

To study the viewership of the CPBL before and after COVID-19, we separately estimated the regression models using the data for the two different years. We evaluated

the potential influence factor on television ratings using ordinary least squares regression (OLS) with White's standard error being found to be robust to heteroskedasticity [42]. Regressions with robust standard errors can effectively handle minor concerns that do not meet assumptions regarding normality, heteroskedasticity, or certain observations that exhibit large residuals, leverage, or influences. As for the independent variables, six were numerical variables, and five categorical variables were denoted as dummy variables in the regression model.

3.2. Data

Data from the two seasons, 2019 and 2020 of the CPBL, which occurred before and after the outbreak of the COVID-19 pandemic, respectively, were used as the subjects of this study. The TV ratings data for each game broadcast were obtained from ABG Nielsen's average viewership of all age groups via a media operator. The information was converted into consumer availability according to the channel and time slot of the broadcast. The original information, which included the tournament schedule, venue, scores, and team performance, were obtained from the official website of the CPBL, and then converted into pre-game team quality, tournament factors, actual game quality, and pre-game team quality based on our own calculations. The expected game quality was based on data from the Taiwan Lottery, which was obtained from the website www.playsport.cc. Leaving aside the playoffs, the number of regular season games per year was 240. After excluding the first opening game, for which no current year data were available and the few games for which TV ratings data or lottery data were missing, the last 222 and 229 games of the 2019 and 2020 seasons, respectively, were used in this study.

4. Results

4.1. Descriptive Statistics

Descriptive statistics for the ratings along with all other variables before and after the pandemic are presented in Table 1. The highest rating in our samples was 1.16 in 2020, and the lowest was 0.05 in 2019. The average rating for 2020 was 0.371, and the standard deviation was 0.144, with both of these being higher than the 0.237 and 0.134 for 2019, respectively. The corresponding pre-game *ClosingLine* and *ClosingTotal*, as well as the actual post-game *SocreSum*, were higher on average in 2020 than in 2019. In terms of the differences between the two teams in the matches, however, the pre-game *GBDiff* average for 2019 was somewhat higher than that for 2020, and the actual post-game *ScoreDiff* average for 2019 was lower than that for 2020. The remaining dummy variables, including *TeamMatchup*, *Field*, *Channel*, *Time*, and *DayOfWeek*, were nearly identical in their frequency of occurrence in 2019 and 2020. *Field* showed that the main tournament venues were Taichung, Taoyuan, New Taipei, and Tainan, with only a few tournaments being held in Hualien, Taipei, and Kaohsiung. The most frequent time slot was night, and only a few games were held in the afternoon, mostly on Sundays, Wednesdays, Fridays, and Saturdays.

Table 1. Descriptive Statistics.

Variable	Before COVID-19 Pandemic in 2019 (n = 222)				After COVID-19 Pandemic in 2020 (n = 229)			
	Mean	SD	Min	Max	Mean	SD	Min	Max
<i>Rating</i>	0.24	0.13	0.05	1.00	0.37	0.14	0.11	1.16
<i>ln(Rating)</i>	−1.59	0.55	−3.00	0	−1.07	0.40	−2.21	0.15
<i>ClosingLine</i>	0.45	0.29	0	1.42	0.60	0.39	0	1.60
<i>ClosingTotal</i>	9.99	1.19	7.50	12.50	11.28	1.53	8.50	14.50
<i>WPSum</i>	1.00	0.12	0	1.21	1.00	0.17	0	2.00
<i>GBDiff</i>	2.97	2.22	0	10.00	2.89	2.81	0	13.00

Table 1. Cont.

Variable	Before COVID-19 Pandemic in 2019 (n = 222)				After COVID-19 Pandemic in 2020 (n = 229)			
	Mean	SD	Min	Max	Mean	SD	Min	Max
<i>TeamMatchup</i>								
BL	0.15	0.36	0	1	0.16	0.37	0	1
BM	0.16	0.37	0	1	0.16	0.36	0	1
BG	0.15	0.36	0	1	0.17	0.37	0	1
LM	0.18	0.38	0	1	0.17	0.38	0	1
LG	0.18	0.39	0	1	0.17	0.38	0	1
MG	0.18	0.39	0	1	0.17	0.38	0	1
<i>Field</i>								
Taichung	0.14	0.35	0	1	0.24	0.43	0	1
Taoyuan	0.27	0.44	0	1	0.25	0.43	0	1
New Taipei	0.27	0.45	0	1	0.26	0.44	0	1
Tainan	0.18	0.39	0	1	0.22	0.42	0	1
Hualien	0.03	0.18	0	1	0.02	0.15	0	1
Taipei	0.05	0.21	0	1				
Kaohsiung	0.06	0.24	0	1				
<i>Channel</i>								
VL								
Sports	0.20	0.40	0	1	0.24	0.43	0	1
MOMOTV	0.40	0.49	0	1	0.34	0.47	0	1
Eleven Sports	0.41	0.49	0	1	0.41	0.49	0	1
<i>Time</i>								
Night	0.56	0.50	0	1	0.58	0.50	0	1
Evening	0.37	0.48	0	1	0.41	0.49	0	1
Afternoon	0.07	0.25	0	1	0.02	0.13	0	1
<i>DayOfWeek</i>								
Sunday	0.20	0.40	0	1	0.21	0.41	0	1
Tuesday	0.10	0.30	0	1	0.10	0.31	0	1
Wednesday	0.19	0.39	0	1	0.19	0.39	0	1
Thursday	0.11	0.31	0	1	0.08	0.28	0	1
Friday	0.18	0.39	0	1	0.21	0.41	0	1
Saturday	0.22	0.41	0	1	0.20	0.40	0	1
ScoreDiff	4.25	3.40	0	16	4.46	3.64	0	20
ScoreSum	10.90	5.65	1	29	11.92	5.49	1	35

4.2. Determinants of Television Ratings

To examine the impact of the COVID-19 outbreak on ratings, we divided the full sample into two subsamples based on the season. The first subsample was the 2019 season before the outbreak. The second subsample was the 2020 season after the outbreak. Then, we estimated the model for each of the two subsamples. We also estimated the baseline model by using all of the observations from 2019 and 2020 for comparison. The results are shown in Table 2.

Table 2. Regression Results of Rating Model.

	Before and after COVID-19 Pandemic (2019–2020)			Before COVID-19 Pandemic in 2019		After COVID-19 Pandemic in 2020			
	Estimate		Robust SE	Estimate		Robust SE	Estimate	Robust SE	
<i>Constant</i>	−2.892	***	0.221	−1.782	***	0.395	−1.847	***	0.356
<i>ClosingLine</i>	0.126	***	0.046	−0.047		0.086	0.053		0.046
<i>ClosingTotal</i>	0.071	***	0.012	−0.024		0.021	−0.009		0.015
<i>WPSum</i>	0.199		0.130	0.115		0.309	0.292	**	0.126
<i>GBDiff</i>	−0.018	***	0.007	−0.007		0.010	−0.007		0.006
<i>TeamMatchup (vs. MG)</i>									
BL	0.398	***	0.074	0.544	***	0.107	0.410	***	0.073
BM	0.472	***	0.067	0.622	***	0.083	0.419	***	0.070
BG	0.614	***	0.063	0.585	***	0.077	0.531	***	0.061
LM	−0.164	**	0.069	0.020		0.099	−0.053		0.075
LG	0.081		0.073	0.001		0.077	0.048		0.081

Table 2. Cont.

	Before and after COVID-19 Pandemic (2019–2020)			Before COVID-19 Pandemic in 2019		After COVID-19 Pandemic in 2020		
	Estimate		Robust SE	Estimate	Robust SE	Estimate		Robust SE
<i>Field (vs. Kaohsiung)</i>								
Taichung	0.268	**	0.117	0.058		0.150	−0.010	0.239
Taoyuan	0.257	**	0.117	0.310	**	0.137	0.058	0.238
New Taipei	0.241	**	0.120	0.084		0.138	0.017	0.243
Tainan	0.234	*	0.120	0.120		0.140	0.042	0.241
Hualien	0.147		0.183	0.027		0.182		
Taipei	0.074		0.180	−0.017		0.167		
<i>Channel (vs. Eleven Sports)</i>								
VL	0.012		0.061	0.283	*	0.152	−0.026	0.067
Sports								
MOMOTV	−0.470	***	0.072	−0.324	***	0.109	−0.336	***
<i>Time (vs. Afternoon)</i>								
Night	0.378	***	0.139	0.198		0.166	0.492	**
Evening	0.426	***	0.099	0.257	**	0.104	0.518	**
<i>DayOfWeek (vs. Saturday)</i>								
Sunday	0.082		0.057	0.013		0.074	0.102	**
Tuesday	0.034		0.104	0.014		0.134	0.002	0.089
Wednesday	−0.092		0.099	−0.108		0.133	−0.142	*
Thursday	0.016		0.101	0.055		0.141	0.063	0.078
Friday	−0.046		0.094	−0.115		0.122	−0.055	0.072
ScoreDiff	−0.024	***	0.006	−0.037	***	0.008	−0.016	***
ScoreSum	0.003		0.004	0.000		0.004	0.004	0.004
adj R ²	0.612			0.722			0.661	
N	451			222			229	

Note. Significance levels * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

From Table 2, we can observe that *ClosingLine* and *ClosingTotal*, which had a positive and statistically significant effect in the model for the full two-year sample, were not significant in the 2019 and 2020 models. The effect of *WPSum* and *GBDiff* was insignificant before the outbreak in 2019, whereas *WPSum* was positive and statistically significant in 2020 after the outbreak. This observation implies that overall audience behavior was significantly motivated by the expected game quality and the pre-game team quality. However, these factors did not significantly affect the intention of the audience before the outbreak, while the audience was more interested in the winning percentage of the teams after the outbreak. *ScoreDiff* consistently had negative and statistically significant effects on the overall behavior before and after the outbreak. The effect of actual game quality on audience behavior did not vary due to the COVID-19 pandemic.

In terms of *TeamMatchup*, we observed that the matchups associated with the Brothers invariably had a positive and statistically significant effect on ratings for the overall, 2019, and 2020 models. The pandemic did not affect the audience's favorite team. The team with the highest ratings was evidently still the Brothers.

With respect to playing fields, the four main fields, Taichung, Taoyuan, New Taipei, and Tainan, were positive and statistically significant in the overall model. Meanwhile, only Taoyuan remained positive and statistically significant in the 2019 model, and the rest were insignificant in both the 2019 and 2020 models. This observation indicates that, in regard to overall audience behavior, viewership varied depending on the region where the game was held. However, when examined by year, the effect was not significant. The viewership of the Taoyuan tournament before the pandemic in 2019 was significantly higher than that of other regions. This outcome was probably due to Taoyuan having had many events in the stadium, which could attract audiences. In 2020, after the outbreak of the pandemic, the number of attendees and events at the stadium were limited; hence, the audience was not affected anymore.

Among the channels, MOMOTV was equally negative and statistically significant in the overall, 2019, and 2020 models, and it was the least popular channel based on audience. A positive and statistically significant effect could also be seen in the 2019 model for VL

Sports, which appeared to be the most popular channel. However, after the 2020 pandemic, this effect was not statistically significant.

Regarding the impact of consumer availability, based on all three models, it was agreed that evenings were the most favored primetime, with a positive and statistically significant effect on ratings. Some shifts occurred in consumer availability in 2020 after the pandemic broke out. Night and evening were equally positive and statistically significant, but the difference in the magnitude of the impact between the two narrowed compared with that for 2019. The effect of the day of the week, which was not significant overall or in 2019, was clearly distinguished during the 2020 pandemic. With Saturday as the basis for reference, Sunday and Wednesday had a statistically significant positive and negative impact on ratings, respectively, in 2020. During the pandemic, audiences had more time to watch the televised games, thus resulting in a change in viewership behavior.

5. Discussion

5.1. The Impact of the COVID-19 Outbreak on Viewership

Our empirical results show that the effect on viewership behavior caused by uncertainty regarding the game was inconsistent before and after the COVID-19 pandemic. The predictions from the betting market, *ClosingLine* and *ClosingTotal*, were positive and significant in the overall model covering both years, thus supporting much of the recent empirical work on the uncertainty surrounding the games [35,43]. However, the effects of *ClosingLine* and *ClosingTotal* were both negative and insignificant in the pre-pandemic 2019 model and positive and negative in the pandemic 2020 model, which was also insignificant. This outcome may suggest that, before the pandemic, audiences preferred matches with more uncertain expected outcomes; whereas after the pandemic, audiences preferred matches with more certain expected outcomes and strong team participation.

The pandemic caused a change in the expectations of the betting market itself, which may also be a reason for the statistical insignificance. *ClosingLine* and *ClosingTotal*, in the two years before and after the pandemic, were indeed different and were validated by an independent samples *t*-test to reach statistical significance ($p < 0.01$). During the pandemic, players had less training and more injuries [44,45], which increased the uncertainty of the expected outcome and led to changes in the ratings model.

Theoretically, the actual game quality and the expected game quality should correspond to each other. *ScoreDiff* and *ScoreSum* should be approximately mapped to *ClosingLine* and *ClosingTotal*, respectively. Although *ClosingLine* and *ClosingTotal* for 2020 were significantly different from those for 2019, *ScoreDiff* ($p = 0.534$) and *ScoreSum* ($p = 0.053$) for 2020 were indeed not significantly different from those for 2019, as verified by the independent samples *t*-test. In other words, the actual game quality before and after the pandemic did not inherently change. This outcome reasonably confirms that the impact of the actual game quality on ratings was not changed by the pandemic, and *ScoreDiff* remained negative and statistically significant.

Regarding the tournament factors, higher television ratings were associated with *TeamMatchup* with greater significance, such as the match between the Brothers and the other three teams. This observation demonstrates that the audience-watching behavior for their favorite team's games is consistent before and after the outbreak. Unsurprisingly, fan loyalty was not affected by the COVID-19 pandemic.

In terms of the field factor, Taoyuan had a huge and significant impact on the ratings before the outbreak. One possible reason for this is that the champions for 2019 were the Monkeys, who hosted most of their games in Taoyuan at its home field. Moreover, the influence of each field was significant in the model covering the two-year sample. However, no significance was observed in the post-outbreak subsample model, thus inferring that the field factor may be related to the more random behavior of viewership after the outbreak.

The biggest difference in terms of the impact of broadcast channels on ratings before and after the outbreak is observed in the case of VL Sports. According to the CPBL broadcasting agreement, each team is authorized to broadcast on a specific channel under their own

contract. VL Sports mainly broadcasts the Brothers' home games, which had a positive and significant impact on ratings in 2019, but was negative and insignificant in 2020. The new spectators seem to care less about which channel they are watching.

With respect to audience availability, we find that the effect of the time slot is consistent and significant across the three models. The most popular time slot is the evening time slot. This effect is greater after the outbreak than before, presumably due to the fact that people who would have been present at the game shifted to watching TV instead at the same time. The effect of day-of-the-week TV on sports viewing, as mentioned in the literature [13,29,46], was not evident in the overall two-year sample or in the pre-pandemic subsample models. However, the post-outbreak subsample model reveals a significant pattern, with the highest demand for viewing being on Sundays and the lowest on Wednesdays. This outcome may be due to the more random viewing behavior of the original audience prior to the 2019 outbreak. However, the impact of COVID-19 in 2020 shifted original holiday attendance and limited holiday activity to television viewing.

5.2. New Spectators' Preferences during the COVID-19 Pandemic

For spectators who do not exhibit loyalty toward any particular teams, the easiest choice for them is to pick the winning teams. Thus, the winning percentage sum of two playing teams intuitively and positively correlates with the 2020 rating. Most notably, eustress also motivates fans to watch games, and watching the teams they support win gives the audience eustress. Thus, spectators tend to follow winning teams' games. Meanwhile, since the winning percentage sum was not significant in 2019, it means that CPBL fans are characterized by a high degree of loyalty.

Game days on Sundays and Wednesdays are statistically significant variables in 2020. CPBL games were played at night during weekdays, and Sunday games started at 2 pm from March to mid-May. Sunday games were played at 5 pm because the weather became too hot. TV ratings showed that spectators did not like afternoon games. People still had the option of going to shopping malls or outdoors while wearing masks instead of staying home watching baseball games. The 5 pm games had higher ratings than 6:30 pm games for two possible reasons. First, 5 pm games were Sunday games, and second, watching baseball games during a family dinner is a favorable activity in Taiwan. Games played on Wednesdays had lower ratings than those played on other days. The most plausible reason is that people still needed to go to work in 2020 during the COVID-19 pandemic.

Taoyuan Stadium, home to the 2019 champions, the Monkeys, hosted several after-game concerts in 2019, thus attracting spectators. However, none of these events took place in 2020. Thus, the ratings went down.

MOMOTV is the only channel that broadcasts content other than sports in this study. The other two channels, VL Sports and Eleven Sports, only broadcast sports content. Moreover, MOMOTV is owned by the same mother company as that for the Fubon Guardians, which hires anchors who are pro-Fubon. The results are shown in Table 2. Both 2019 fans and 2020 fans and spectators are not too keen on anchors that support one specific team too much. On the other hand, the VL Sports channel had high ratings in 2019, but not in 2020. Being the first professional sports channel in Taiwan, VL Sports has a good reputation. However, new spectators do not know or care about the channel's standing. As for the production company, when new spectators are watching, the company prioritizes by providing entry-level information to potential fans instead of just deep, professional content.

The characteristics and preferences of these new audiences derived in this study echoed the findings of [8], which analyzed the demographic variables of the increase in CPBL viewership in 2020 compared to 2019 from proprietary data. Looking at gender, female viewers grew from 5% to 15%. In terms of age group, the 35–49 age group was the main driver of rising CPBL TV viewership in 2020. Regarding occupation, retirees and the unemployed watched more CPBL; the latter was probably a result of the adverse interplay of a job loss caused by COVID-19 and a demand for entertainment.

6. Conclusions and Suggestions for Future Research

This study estimated the determinants of CPBL television viewership for regular season matches in 2019 and 2020, and examined whether audience behavior varies given the changes in game characteristics during the COVID-19 pandemic. The results indicate that the ratings have been significantly affected by the expected game quality, pre-game team quality, actual game quality, tournament factors, and audience availability in the years preceding and following the outbreak of the pandemic. However, many of these factors have turned out to be insignificant when estimated on a year-by-year basis. As a contribution to filling a gap in sports communication research, this study provides the first empirical analysis of the factors driving TV ratings of CPBL matches, as well as the impact before and after the COVID-19 outbreak.

The impact of the pandemic has caused the *ClosingLine* and *ClosingTotal* provided by the betting market to differ in nature, thus making the impact on the TV ratings model inconsistent in the year before and after the pandemic. We also demonstrate that after the outbreak of the pandemic, the effects of fields have decreased, while the effects of the day-of-the-week have shifted to a significant level. This shift is probably due to baseball stadium attendance restrictions and fears of infection, and as such games have been televised instead. By contrast, the audience's loyalty to their favorite teams, preferred channels for televising games, and viewing habits in the evening have been relatively unaffected by the pandemic. This study has also found that, for the CPBL ratings model, the team matchup is a very important factor, similar to the rivalry game in other professional sports ratings studies.

There are several practical suggestions for sport practitioners. Before the COVID-19 outbreak, the field did affect viewership, and it should be related to the in-game atmosphere in the baseball stadium, such as mascots, cheering crews, support songs and dances, and theme parties. In contrast to the local MLB ratings in the United States, the novelty of these peripheral activities of baseball in Taiwan, Japan, and Korea in Asia can attract new viewers in the United States to sustain watching after the pandemic [47]. Based on the evidence presented in this study, team practitioners can be more convinced in allocating resources to sustain the peripheral activities in the stadium. In addition, understanding the influence factors of viewership can help negotiate broadcast royalties between team practitioners and TV channels. In 2020, the year of the COVID-19 pandemic, the viewership of CPBL games was considerably up, but the viewership of MLB in the United States was down [48]. Although the start of the MLB season was pushed back to July and only 60 of 162 games were completed, the lower ratings may be due to the fact that some viewers have shifted to licensed webcasts. However, the team's annual revenue from media rights deals, including television and online media, was not significantly impacted by the pandemic [49]. Practitioners of CPBL should take events like COVID-19 into consideration for risk management [50], and consider the development of webcasting, new media, and online social interaction in order to respond to the challenges of other crises in advance.

While the current study has sought to aggregate a variety of data regarding the game at the present time, encompassing pre-game team performance, betting market predictions, actual scores, and not easily accessible viewership data, several research limitations remain. Ideally, by obtaining the viewership data from the Internet broadcast platforms in addition to the TV broadcast, we can more accurately identify the impact of the game dynamics on the viewership given the current trend toward an increasing proportion of viewership via Internet broadcasts. Watching baseball games on a mobile device over the Internet, anywhere and at any time, could reveal different behavioral patterns from watching TV broadcasts in the living room at home, which is an ongoing issue for future research. A better and more comprehensive understanding of audience preferences could lead to more ideal strategies that professional sports leagues can adopt when external environmental events occur, such as the COVID-19 pandemic. Although the data were gathered during the COVID-19 period, we suggest that the model might be similar to when other similar events happen, e.g., wars, extreme weather, etc. More broadly, two aspects can be observed when people are deprived of their social lives. Firstly, what do they do to sustain the

situation, and secondly, how do the replacement activities utilize the situation so that if they are impacted by the situation as well, they can then sustain it. In this research, we only explored the second aspect and analyzed how baseball viewership changed during the COVID-19 pandemic.

In addition, this study uses only two seasons of data for making the comparison, which is limited by the difficulty in obtaining data, and the benefit of minor changes in the contextual conditions of the games over a short period. The CPBL has many characteristics that are somewhat different from those in other professional baseball leagues, such as the number of teams, venue of games, broadcasting rights, and program production methods, and these factors may change every year. However, what has not changed much is Taiwan's annual ranking in the world of baseball, which is a special case in professional baseball. The changing nature of the league makes it difficult to retain consistent contextual conditions over a long period for viewership behavior analysis. Future researchers should be encouraged to obtain and adopt viewing data over a longer period and to overcome the aforementioned challenges to gain a deeper understanding of viewership behavior as a reference for planning strategies to enlarge the professional baseball fan base.

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