Game Information, Local Heroes, And Their Effect On Attendance: The Case Of The Japanese Baseball League

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ABSTRACT

In the Japanese Professional Baseball League, the starting pitcher is announced prior to the game in the Pacific League but not in the Central League. I attempt to investigate how the release of information concerning a starting pitcher prior to the game affects attendance. My major findings are: (1) In the Pacific League, the salary (and overall number of wins) of the home team's starting pitcher is positively related to attendance, while that of the visiting team is not. (2) In the Central League, neither the salary (or the overall number of wins) of the home team's starting pitcher nor that of the visiting team affect attendance.

Keywords: Game information; attendance; Japanese Professional Baseball League

1. Introduction

Demand for professional sports is one of the major issues in the field of sports economics and much research has been undertaken to ascertain the determinants of attendance for baseball games (e.g., Bruggink and Eaton 1996; Burdekin and Idson 1991; Hill et al. 1982; Hunt and Lewis 1976; Kahane and Shmanske 1997; Knowles et al. 1992; Noll 1974; Schmidt and Berri 2001, 2002, 2004). It is generally acknowledged that information on the quality of goods is very important for consumer decision making. For instance, the recent performance of the home and visiting teams and, hence, their current rankings are regarded as the main factors determining the quality of a game. In addition, the likelihood that a star player will take part in a game is thought to affect fans' perceptions of game quality; not only because of an increase in the winning probability when a star participates in a game but also because of the star effect stemming from imperfect substitution (Rosen 1981). As noted by Gwartney and Haworth (1974), "Outstanding players are thought to exert an additional impact on attendance because customers like to observe players of exceptional ability, even if they play for a 'losing team'". Furthermore, the degree of a star player's popularity appears to depend on the town in which a game is held since the star player would be more attractive to fans from the same hometown. This is somewhat analogous to customer racial discrimination in the baseball market (e.g., Andersen and La Croix 1991; Irani 1996; Kahn and Sherer 1988; Nardinelli and Simon 1990)[1]. The composition of the starting roster and the town where the game is held are closely related to game quality. Previous information about the starting players is thus very important when the demand for the game is considered.

Familiarity with a home team's players should increase a fan's enjoyment of

the game, thereby increasing attendance (Kahane and Shmanske 1997). If a player is from a fan's home town, this sense of familiarity is further enhanced. Accordingly, people are more inclined to attend a game if they know that a player coming from their home town is a starting member. It follows from this that familiarity with home players appears to enlarge the 'local star' effect and play an important role in increasing game attendance.

The Japanese Professional Baseball League (JPBL) has a two league system comprised of the Pacific and the Central Leagues (La Croix and Kawaura 1999, Yamamura and Shin 2008a, 2008b). In the Pacific League, the starting pitcher is announced in advance of a game, while in the Central League they are not. Compared with other positions, pitchers vary game by game. This feature causes game quality to rely considerably on the starting pitcher. The different systems mean that fans can obtain information concerning game quality for Pacific League but not Central League games, resulting in differences in game demand behavior. Under such conditions, the JPBL conditions allow me to compare people with information on game quality to ones without it. Using the panel data of JPBL game attendance during the 2005-2007 period, this research attempts to analyze how and to what extent the different systems between the two leagues have an influence on game attendance through the availability or unavailability of information prior to games and informal social connections.

2. Conditions of the Japanese Professional Baseball League

In the post-war period, Japan's unprecedented economic growth resulted in increasing demands for the leisure industry. The JPBL has clearly been one of the most popular segments of the leisure industry. The JPBL was inaugurated in 1936

comprising seven teams in one league. In 1950, JPBL was divided into two leagues, the Central League (CL) and the Pacific League (PL) (La Croix and Kawaura 1999).

The Yomiuri Giants of the Central League have consistently dominated the JPBL and assured its supremacy. The Giants are the premier team, similar to the New York Yankees in Major League Baseball. The development and diffusion of broadcasting has also increased public interest in the JPBL, particularly in the Giants[2]. Not only fans, but also anti-fans of the Giants are interested in Giants games via broadcasts of baseball games. Necessarily, other Central League teams have been able to attract fans' attentions and thereby increase attendance from games against the Giants. With respect to fan popularity, as provided in the first row of Table 1, the mean value of attendance at Pacific League games is smaller by approximately 7,000 compared with that of Central League games, which is statistically significant at the 1% level. Consistent with the conjecture, this indicates that the Central League is more popular than the Pacific. The relationship between the Central and the Pacific Leagues appears to be similar to that between the American and National Leagues in Major League Baseball in the United States. A structure in which the Central League teams depend upon the Giants for popularity rather than their own efforts has persisted over a long period of time (Kobayashi 2004).

In an attempt to increase their popularity, the Pacific League has adopted various systems which the Central League does not have. For instance, in the split season system adopted in the 1973-1983 period, the winners of the first and second halves of the season compete in a playoff to determine the Pacific League winner of the year. The practice of releasing the name of the starting pitcher prior to a game began in 1985. Although from 1985 to 1993 this practice was applicable to just

Sunday games; after 1994 the starting pitcher for all games was announced in advance. As reported by Yamamura and Shin (2008a), the gap in attendance between the two leagues did not narrow until at least the mid-1980s. Subsequently, a rapid catch up then followed, particularly during the period 1985-1992, although the difference in attendance numbers continued to exist after even 2005 (Table 1). Based on this I derive the argument that the introduction of the practice providing information about the starting pitcher made a substantial contribution to the rise in attendance at Pacific League games. Furthermore, it seems appropriate to propose that the home team's starting pitcher announcement has a greater effect on attendance than the visiting team's because of the larger demand from fans of the home team[3]. It seems reasonable to postulate the following hypothesis[4]:

Hypothesis 1: *If fans know who will be the starting pitcher, then the degree of his popularity will be positively associated with game attendance. Furthermore, this effect is greater for the home team pitcher than for the visiting one.*

It is widely known that the Japan Professional Football League (JPFL), inaugurated in 1993, has become very popular mainly because of people's affection for their hometown teams (Nihon Keizai Newspaper (ed.) 2005). By contrast, as stated earlier, JPBL developed considerably thanks to diffusion from broadcasting. After the emergence of the JPFL, regarded as a substitute for the JPBL, it was observed that the popularity of JPBL drastically declined (Yamamura and Shin 2008 b). The introduction of JPFL put competitive pressure on JPBL in the professional sports market. Such conditions induced the Pacific League to consider it critical to attach

importance to the team's home town and local fans while the Central League is more likely to stick to the past way presumably as a result of past experiences of success.

Sadaharu Oh was the manager of the Fukuoka Hawks, located in the Kyushu region and regarded as the dominant team in the Pacific League[5]. He has adopted the principle of attaching importance to the home town in constructing the team. According to Oh, the key players of the Hawks mostly came from Kyushu, which is the southern region of Japan and approximately 900 km distant from Tokyo. Players who were brought up in the team's home town have become the main force and play an important role in games, leading local people to be fond of and support the team (Nagatani 2005)[6]. This suggests that it is very important to foster local star players to attract local fans[7].

Under the practice of releasing the name of the starting pitcher prior to a game, more popular pitchers are put on the starting roster, resulting in increased attendance. As pointed out by Gwartney and Haworth (1974), in MLB, starting black players may attract black customers who had previously attended games mainly for the reason that they wanted to enjoy games in the stadium. If the same logic holds true for local customers, then it would be reasonable to assert that the players coming from the town where the game is held will attract local customers who previously have not attended baseball games. On the other hand, if there is prejudice against foreign players among baseball fans, then this system would decrease the attendance for games in which the starting pitcher comes from abroad. Furthermore, such informal social networks and discrimination effects will amplify the popularity of star players because local customers are more likely to become loyal supporters of star players than those unfamiliar to them. These arguments can be summarized by the following

hypothesis:

Hypothesis 2: *Under the practice of releasing the name of the starting pitcher prior to a game, the magnitude of the star player's effect on attendance would be greater when he came from the team's hometown. Furthermore, it would also be greater if he was Japanese, rather than foreign.*

Before proceeding to the regression analysis, it is useful to make a preliminary comparison between the two leagues across the features of starting pitchers. From the top row of Table 2(a) and (b) it can be seen that attendance is statistically larger in cases when the home team's starting pitcher's home town is the same as the team's hometown in the Pacific and Central leagues. On the other hand, attendance does not increase even if the visiting pitcher comes from the home team town, regardless of the league. Looking at the third and fourth rows shows that attendance at PL games was significantly smaller in games when the starting pitcher was a foreigner, while there is no such effect at CL games. These findings are almost congruent with expectations. Nevertheless, as shown in the results of the CL, characteristics of the starting pitcher partly affects attendance even when no previous information released concerning the starting pitcher. Such an unexpected result calls for additional investigation.

Although baseball has been among the most popular leisure industries in Japan, few researchers have attempted to examine how people become fans and decide to attend the baseball games of JPBL. This might partly be because the exact attendance numbers could not be obtained[8]. In 2004, JPBL confronted this difficulty

and carried out a reform because of its substantial decline in popularity (Nihon Keizai Newspaper, 2005, Ninomiya and Higuchi 2005)[9]. As a consequence, accurate attendance figures began to be announced for each game from 2005. Therefore, the availability of accurate data in 2005, 2006, and 2007 enabled me to investigate how and to what extent releasing the name of the starting pitcher affects game attendance by comparing the PL and CL. I use an originally constructed panel data set to examine the above hypotheses in the following section.

3. Econometric Framework and Estimation Results.

A. Econometric framework

To examine the empirical hypotheses raised in the previous section, the basic regression equation takes the following form:

$$
\begin{aligned}
Ln(ATTEN)_{ijst} = {} & \alpha_1 Ln(HPAY)_{ijst} + \alpha_2 Ln(VPAY)_{ijst} \\
& + \alpha_3 Ln(HPAY)_{ijst} * HHOM_{ijst} + \alpha_4 Ln(VPAY)_{ijst} * VHOM_{ijst} \\
& + \alpha_5 Ln(HPAY)_{ijst} * HFORE_{jst} + \alpha_6 Ln(VPAY)_{ijst} * VFORE_{jst} \\
& + \alpha_7 Ln(HWINR)_{ijst} + \alpha_8 Ln(VWINR)_{ijst} \\
& + \alpha_9 WKEND_{st} + \alpha_{10} HOLID_{st} + \delta_s + \nu_{ij} + u_{ijst},
\end{aligned}
$$

where $ATTEN_{ijst}$ represents the dependent variable (attendance per game) in prefecture *i,* stadium *j,* year *s,* and date of game *t*. α's represents the regression parameters. δ_s,ν_{ij}, u_{ijst} represent the unobservable specific effects in the *s'*s year (a fixed effect time vector), the individual effects of *j* 's stadium in *i* 's prefecture (a fixed effects prefecture vector) and an error term, respectively. A panel structure is used for the data set in this study. In particular, special attention needs to be paid to the omitted

variable bias stemming from unobservable individual stadium characters and access to the stadium. In addition, various substitute goods often exist in the surrounding area[10]. With the aim of controlling for these variables, fixed effects estimation is employed (Baltagi, 2005)[11]. Year dummies were also incorporated to control for δ_s, which represents conditional and structural changes at the macro level and could affect the demand for baseball game tickets.

Ticket prices, which are expect to have a significant effect on game attendance, are fixed within a season but vary between seasons for the same team. Besides the pitcher, other members of a team do not greatly vary during the season. The regular members, however, would be different each season because team strategy appears to depend upon the performance of the past season. For the purpose of controlling for ticket prices and regular team members, interaction terms between year and stadium dummies are incorporated as independent variables. These interaction terms also control for the level of income and population size of places where games are held.

In an attempt to estimate the elasticity to compare the magnitude of the dependent variables, the function takes a linear form[12]. Dependent and independent variables are evaluated at the sample means, and therefore the coefficient values reported can be interpreted as elasticity[13]. The error terms for games being held at the same stadium might correlate because conditions are shared. Otherwise, the standard errors of the coefficients might be biased downward (Moulton 1990). To control for this bias, robust standard errors are calculated by clustering on the home stadium. Then, t-values are obtained by the cluster–robust standard errors.

To examine Hypothesis 1, check *HPAY* and *VPAY* stand for the salary of home team's starting pitcher and that of the visiting one, respectively. There are a number

of measures of a team's popularity, such as the performance during past years, player numbers selected to play in all star games, and the number of championship titles. In this paper, salary is considered to represent these factors and popularity because not only the player's record but also some subjective charm might attract fans and therefore increase the revenues of team. Furthermore, it is reasonable to assume that team revenue is positively associated with the salary of its players. As a consequence, the extent of a player's popularity and his 'stardom' is thought to be reflected in their salary. Even prior to a new season, salary data of new players can be available since it is set out in the player's signing contract. While the salary of starting pitchers is a convincing way to proxy a pitcher's record and popularity it may not capture the full impact. Market imperfections can greatly affect player salaries. In the JPBL, free agents are able to earn their economic worth but younger players face market constraints. Under such conditions, using only the pitchers' starting salaries will distort the results. It is necessary to use an alternative measure with the aim of checking the robustness of estimation results. To this end, I also use the overall number of wins of starting pitchers as a proxy of a starting pitcher's popularity. Hence, I employ the alternative specification where *HSPWIN* and *VSPWIN*, representing the overall number of wins of a home starting pitcher and those of the visitor starting pitcher, to capture popularity instead of *HPAY* and *VAPY*. The advantage of this variable is that number of wins avoids bias under market constraints. New pitchers have, however, no recorded performance in the JPBL and so are omitted from the sample when estimations are conducted using the overall number of wins as a proxy of the popularity of starting pitchers[14].

Following the discussion up to this point, a home pitcher would be more attractive

locally for home fans than visiting ones even if their performance and charm do not greatly differ. If Hypothesis 1 is supported, I expect that the signs of *HPAY* and *VPAY* to be positive and the magnitude of *HPAY* larger than that of *VPAY* in PL estimations. However, there would be no effect on them in the CL because of the lack of information about the starting pitcher.

To capture the characteristics of the starting pitcher, I defined various dummies as follows. *HHOM* is 1 when the home team's starting pitcher's hometown is the town in which game was held, otherwise it is 0. *VHOM* is 1 when the visiting team's starting pitcher's hometown is the town in which the game was held, otherwise it is 0. *HFORE* is 1 when the home team's starting pitcher is a foreigner, otherwise it is 0. *VFORE* is 1 when the visiting team's starting pitcher is a foreigner, otherwise it is 0. To examine Hypothesis 2 concerning the starting pitcher's hometown effect on his local popularity, the interaction of *HPAY* with *HHOM,* and of *VPAY* with *VHOM,* are incorporated. Their anticipated signs are positive, indicating that the salary of starting pitchers makes a greater contribution to a rise in attendance if he comes from the team's hometown. Furthermore, with the aim of determining the effect of foreigners on attendance, the interaction of *HPAY* with *HFORE,* of *VPAY* with *VFORE,* are incorporated. They are predicted to take negative signs since discrimination against foreign players would decrease his popularity, leading to a decline in attendance.

Following previous reports (e.g., Bruggink et al. 1996, Irani 1996, Kahane and Shmanske, Knowles et al. 1992, Whitney 1988), I include various control variables as below.

The home team plays a match against a visiting team, and therefore the value of a game is determined not only by the quality of the home team but also by the visiting

team. Hence, I incorporate *HWINR* and *VWIN,* which are the winning percentages of the home and away teams, respectively, in the current season prior to the game. It seems reasonable that fans enjoy seeing their team win and would like to see their team's win the championship. This leads me to expect the signs of these variables to be positive.

Because fewer people work on weekends and national holidays, the opportunity cost of attending games at these times is lower. Inevitably, both of these dummy variables denoted as *WKEND* and *HOLID* are expected to have a positive effect on attendance.

B. Results and discussion (HPAY and VPAY used to capture popularity*)*

As already noted, data are at game level during the 2005-2007 seasons, and total observations of the Pacific and the Central Leagues are 804 and 822, respectively. These samples do not include games played away from the home cities of either team. Game attendance, team win rate, weekend dummy, and holiday dummy were collected from the baseball yearbook, *Nihon Puro-yakyu Kiroku Nenkan* (various years). Starting pitcher characteristics are from the directory of baseball players, *Puro-yakyu Senshu Meikan* (various years).

Table 3 presents the results when *HPAY and VPAY* are used to capture popularity, and Table 4 provides results when *HSPWIN and VSPWIN* capture the popularity. In Tables 3 and 4, columns (1), (3), (5), and (7) exhibit the results for the PL, whereas (2), (4), (6), and (8) show those for the CL. I now look at Table 3.

It can be seen from the first and second rows of Table 3 that the signs of *HPAY* and *VPAY* are positive in all estimations. In column (1), showing a PL result, *HPAY* is

statistically significant at the 1% level, whereas *VPAY* is significant at the 5 % level. What is more, the value of *HPAY* is 0.02, which is distinctly larger than that of *VPAY,* 0.006. Because a pitcher's salary is considered a proxy for his quality, this implies that a 1% increase in the salary of the home team's starting pitcher leads to 0.02% augmentation in attendance, whereas a 1% higher amount in the salary of visiting team's pitcher results in only a 0.006 % rise in attendance. In the case of the CL, shown in a column (2), in contrast with the PL, both *VPAY* and *HPAY* are not statistically significant. The results for the PL and CL are consistent with Hypothesis 1.

Turning to the interaction terms of *HPAY***HHOM* and *VPAY***VHOM;* these yield positive signs, while *HPAY***HHOM* become statistically significant at the 5 % level in results for the PL seen in columns (3) and (7). On the other hand, as seen in the results for the CL in columns (4) and (8), *HPAY***HHOM* and *VPAY***VHOM* produce negative signs and are not statistically significant. These results indicate that the salary of a starting pitcher who comes from a team's hometown has a greater effect on attendance than that of one coming from outside, but only when the stating pitcher is announced beforehand. This holds for home starting pitchers, but not for visitor starting pitchers.

With respect to the *HPAY***HFORE,* and *VPAY***VFORE,* as exhibited in columns (5) and (7), their coefficients for the PL take negative signs, and in particular *HPAY***HFORE* are statistically significant at the 1 % level, indicating that a foreign starting pitcher's salary has a smaller effect on attendance than a Japanese pitcher's salary. This association holds for home starting pitchers, but not for visitor starting pitchers. This result supports Hypothesis 2. On the other hand, in the CL estimation, *HPAY***HFORE* show a positive sign in columns (6) and (8).

As for the various control variables, in line with the prediction, *HWINR* and *VWIN*

take positive signs in all estimations. Furthermore, with the exception of *HWINR* of the PL, they are statistically significant. As anticipated previously, *WKEND* and *HOLID* show positive signs and are statistically significant at the 1 % level in all estimations. These results indicate that attendances on weekends and holidays are significantly larger than on weekdays.

C. Results and discussion *(HSPWIN and VSPWIN* used to capture popularity*)*

I now look at the results of an alternative specification when *HSPWIN* and *VSPWIN* are used as proxies of starting pitchers' popularity instead of *HPAY* and *VPAY*, provided in Table 4. As shown in columns (1) and (2), *HSPWIN* yields positive signs and is statistically significant at the 1 % level in the PL, but not the CL. The magnitude of the coefficient of *HSPWIN* is 0.02 in the PL. This is consistent with the result of *HPAY* shown in Table3. Signs of *VSPWIN* are negative and statistically insignificant both in the PL and CL. Considering these results together; in the PL, home starting pitchers have a positive effect on attendance. The combined results indicate that the positive impact from the home team's starting pitcher is far larger than that of the visiting team's pitcher, which strongly supports Hypothesis 1.

As for the interaction term, in the case of the PL shown in columns (3) and (7), signs of *HSPWIN*HHOM* and *VSPWIN*VHOM* are positive, with *HSPWIN*HHOM*, statistically significant. On the other hand, in the case of the CL shown in columns (4) and (8), they are not statistically significant. These results are similar to those for *HPAY*HHOM* and *VPAY*VHOM* presented in Table 3.

As regards *HSPWIN*HFOR* and *VSPWIN*VFORE*, they do not become statistically significant in all estimations although *HSPWIN*HFOR* of the PL takes a predicted

negative sign. These are out line with the results in Table 3. This might partly be because games of new starting pitchers are excluded from the sample, causing *HSPWIN*HFOR* to be insignificant.

Overall, given the practice of announcing starting pitchers, information of starting pitchers who come from a team's hometown significantly enhance the effects of their salary and the overall number of wins on game attendance.

With respect to other variables, coefficients of *HWINR* and *VWINR* take positive signs in all specifications, while those of *HWINR* are not statistically insignificant. The combined results of Tables 3 and 4 indicate that attendance with respect to the home team's win rate is less elastic than that of the visiting team's. I interpret this as indicating that compared with the visiting team's fans, the home team's are more interested simply in seeing their home team play rather than the team's performance, presumably as a result of their addictive behavior. *WKEND* and *HOLID* were almost the same as in Table 3 and therefore hardly affected in the alternative estimation.

Overall, the findings presented in this section strongly and consistently support my hypotheses[15].

4. Conclusion

It is generally acknowledged that information on the quality of goods is very important for consumer decision making. The quality of a baseball game is determined by various factors, one of which is the team's player composition. Compared with other positions, which are usually occupied by the regular position players, the starting pitcher changes for each game. It seems crucial for fans to obtain information about the starting pitcher prior to making a decision on game attendance.

In addition, a player's salary is to some extent considered to reflect not only his performance but also the extent of his popularity. As regards game attendance, the popularity of a player appears to depend on the city in which the game is held, an issue arising from consumer discrimination (Becker 1971). It seems reasonable to assert that, other things being equal, fans are likely to prefer home team players to visiting team players. Furthermore, because of informal social connections, they appear to be fond of players whose hometown is the same as the home team's. As a result, the starting pitcher seems to have an effect upon game attendance and the magnitude of this effect relies upon the city in which game is held.

In the case of JPBL, the starting pitcher is announced prior to the game in the PL, but not in the CL. These different practices between leagues is expected to have an affect on attendance. Comparing the PL and CL, I attempted to investigate how and to what extent the release of information on the starting pitcher prior to a game affects attendance. The major findings from the fixed effect estimation are as follows:

(1) In the PL, the salary (overall number of wins) of the home team's starting pitcher is positively related to attendance.

(2) In the CL, neither the salary (overall number of wins) of the home or the visiting team's starting pitcher affects game attendance.

(3) In the case of the PL, the positive effect of salary (overall number of wins) on attendance is larger when the starting pitcher's is from the same hometown as that of the team when a game is held in that town. On the other hand, the effect of salary declines when the starting pitcher is a foreigner.

Based on these findings, I argue that the release of information on a pitcher increases demand for local 'star players', whereby local residents are more likely to

attend a game. The practice of announcing pitchers prior to a game in the PL is a suitable strategy for satisfying the demands of local fans.

Table 1. Mean values for the Pacific and Central leagues.

Variables	Definition	Pacific	Central	All	t-value
ATTEN [a]	Attendance per game	20,343	27,600	24,081	14.5**
HPAY	Salary of home team's starting pitcher (in millions of Yen)	61	83	72	6.17**
VPAY	Salary of visitor team's starting pitcher	63	83	73	5.53**
HSPWIN	An overall number of wins of home team's starting pitcher	31	47	39	7.94**
VSPWIN	Overall number of wins of visitor team's starting pitcher	32	47	40	7.70**
HWINR [b]	Home team's win rate during the current season	0.49	0.49	0.49	0.04
VWINR [b]	Visiting team's win rate during the current season	0.48	0.49	0.49	0.52
HHOM	Is 1 when home team starting pitcher's home town is the town in which game was held, otherwise 0.	0.03	0.03	0.03	0.07
VHOM	Is 1 when visitor team starting pitcher's home town is the town in which game was held, otherwise 0.	0.04	0.02	0.03	2.05*
HFORE	Is 1 when home team starting pitcher is a foreigner, otherwise 0.	0.16	0.16	0.16	0.02
VFORE	Is 1 when visitor team starting pitcher is a foreigner, otherwise 0.	0.17	0.15	0.16	1.38
WKEND	Is 1 when game was held on a weekend, otherwise 0.	0.36	0.35	0.36	0.82
HOLID	Is 1 when game was held on a holiday, otherwise 0.	0.63	0.63	0.63	0.01

Notes: ** and * means that difference is significant at the 1 % and 5% level, respectively.

a. Games played away from the home cities of either team are not included in the sample.

b. Winning percentage in the current season prior to the game.

Table 2. Comparison of characteristics of starting pitchers

(a) Comparison of average number of game attendance among starting pitcher characteristics. (Pacific League)

Home team's starting pitcher's hometown same as the town in which game was held.	Others	t-value
27,428 (37)	20,059 (923)	5.48**
Visiting team's starting pitcher's hometown same as the town in which game was held.	Others	
19,552 (38)	20,376 (922)	0.61
Home team's starting pitcher is a foreigner	Others	
18,064 (157)	20,789 (803)	3.86**
Visiting team's starting pitcher is a foreigner	Others	
19,343 (166)	20,545 (794)	1.68*

(b) Comparison of average number of game attendance among starting pitcher characteristics. (Central League)

Home team's starting pitcher's home town same as the town in which game was held.	Others	t-value
35,570 (40)	27,274 (980)	3.88**
Visiting team's starting pitcher's home town same as the town in which game was held.	Others	
25,630 (24)	27,647 (996)	0.73
Home team's starting pitcher is a foreigner	Others	
26,129 (163)	27,879 (857)	1.53
Visiting team's starting pitcher is a foreigner	Others	
26,269 (153)	27,834 (867)	1.34

Notes: Values in parentheses are number of observations. ** and * means that difference is significant at the 1 % and 5% level, respectively.

Table 3. Determinants of attendance (Fixed Effects estimation)

Variables	(1) Pacific	(2) Central	(3) Pacific	(4) Central	(5) Pacific	(6) Central	(7) Pacific	(8) Central
HPAY	0.02**	0.004	0.02**	0.004	0.03**	0.004	0.02**	0.004
	(3.34)	(1.03)	(3.04)	(1.05)	(4.21)	(0.93)	(3.87)	(0.95)
VPAY	0.006*	0.005	0.005*	0.005	0.01*	0.005	0.009	0.005
	(2.23)	(1.04)	(1.71)	(0.94)	(2.21)	(1.07)	(2.13)	(0.92)
*HPAY**			0.001*	-0.0007			0.001*	-0.0007
HHOM			(1.77)	(-1.30)			(1.85)	(-1.33)
*VPAY**			0.001	-0.0007			0.0009	-0.0007
VHOM			(1.42)	(-0.08)			(1.42)	(-0.08)
*HPAY**					-0.002**	0.0001	-0.002**	0.0001
HFORE					(-2.89)	(0.05)	(-2.86)	(0.04)
*VPAY**					-0.01	0.00004	-0.01	0.00003
VFORE					(-1.28)	(0.01)	(-1.27)	(0.01)
HWINR	0.04	0.09*	0.04	0.09*	0.04	0.09*	0.04	0.09*
	(0.71)	(1.76)	(0.72)	(1.77)	(0.74)	(1.75)	(0.75)	(1.76)
VWINR	0.14**	0.13**	0.14**	0.13**	0.13**	0.13**	0.13**	0.13**
	(3.29)	(3.76)	(3.32)	(3.81)	(3.16)	(4.00)	(3.19)	(4.09)
WKEND	0.08**	0.04**	0.08**	0.04**	0.08**	0.04**	0.08**	0.04**
	(6.57)	(4.66)	(6.57)	(4.68)	(6.52)	(4.76)	(6.53)	(4.79)
HOLID	0.02**	0.01**	0.02**	0.01**	0.02**	0.01**	0.02**	0.01**
	(4.25)	(3.23)	(4.26)	(3.22)	(4.20)	(3.17)	(4.21)	(3.17)
R-square	0.37	0.20	0.34	0.20	0.34	0.20	0.35	0.20
Observations	804	822	804	822	804	822	804	822

Notes: HHOM , VHOM, HFORE, VFORE, and Year dummies are included in the function but not reported to save space. Numbers in parentheses are t-values calculated using robust standard errors clustered at the stadium. ** and * means statistically significant at the 1 % and 5% level, respectively.

Table 4. Determinants of Attendance (Fixed Effects estimation)

Variables	(1) Pacific	(2) Central	(3) Pacific	(4) Central	(5) Pacific	(6) Central	(7) Pacific	(8) Central
HSPWIN	0.02**	0.007	0.02**	0.007	0.02**	0.007	0.02**	0.007
	(2.72)	(0.97)	(2.54)	(0.96)	(3.39)	(0.98)	(3.19)	(0.97)
VSPWIN	-0.001	-0.001	-0.002	-0.002	-0.03	-0.002	-0.003	-0.003
	(-0.37)	(-0.38)	(-0.50)	(-0.41)	(-0.48)	(-0.59)	(-0.59)	(-0.56)
*HSPWIN**			0.003*	-0.0001			0.002*	-0.0001
HHOM			(2.23)	(-0.20)			(1.97)	(-0.16)
*VSPWIN**			0.001	0.0003			0.001	0.0003
VHOM			(0.80)	(0.42)			(0.81)	(0.46)
*HSPWIN**					-0.007	0.0001	-0.006	0.0002
HFORE					(-1.41)	(0.16)	(-1.37)	(0.21)
*VSPWIN**					0.03	0.001	0.003	0.001
VFORE					(0.50)	(0.51)	(0.49)	(0.51)
HWINR	0.03	0.12	0.03	0.11	0.04	0.12	0.04	0.11
	(0.52)	(1.56)	(0.53)	(1.55)	(0.56)	(1.57)	(0.57)	(1.57)
VWINR	0.13**	0.15**	0.13**	0.14**	0.13**	0.14**	0.13**	0.14**
	(3.12)	(2.47)	(3.11)	(2.54)	(3.42)	(2.52)	(3.41)	(2.60)
WKEND	0.09**	0.04**	0.09**	0.04**	0.08**	0.04**	0.09**	0.04**
	(6.19)	(3.83)	(6.13)	(3.80)	(6.23)	(3.77)	(6.17)	(3.75)
HOLID	0.02**	0.01**	0.02**	0.01**	0.02**	0.01**	0.02**	0.01**
	(4.92)	(3.13)	(4.91)	(3.09)	(4.96)	(3.10)	(4.95)	(3.06)
R-square	0.37	0.19	0.37	0.19	0.37	0.19	0.37	0.19
Observations	598	604	598	604	598	604	598	604

Notes: HHOM , *VHOM, HFORE, VFORE,* and Year dummies are included in the function but not reported to save space. Numbers in parentheses are t-values calculated using robust standard errors clustered at the stadium. ** and * means statistically significant at the 1 % and 5% level, respectively.

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[1] Becker (1971) was the first to theoretically account for the phenomenon of discrimination in the market.

[2] Almost all games of the Giants were broadcast nationwide because the Giants owner and sponsor is the Yomiuri Group, a newspaper publishing company that holds subsidiary companies including the TV broadcasting company, Nihon Television.

[3] As shown in Table 1, there is hardly any difference between home team and visitor team win rates for either league. Total win rate of home and visitor teams does not reach 1 since there are some games ended in a draw.

[4] A number of prior reports have examined how the characteristics of starting pitchers affects the outcomes of attendance (Scully 1974, Hill et al. 1982, Bruggink et al 1996).

[5] Sadaharu Oh was a prestigious player and member of the Giants during their golden age in the 1960s in which the Giants retained the championship for 9 years. In conjunction with the team dominance and development of JPBL, he became a nationwide superstar. After Oh retired as a player he became supervisor of the Giants from 1984-1988, leading them to a pennant race win, during which time the Giants benefited from the broadcasting effect. From 1995 to 2008 he was supervisor of Pacific League team, the Fukuoka Hawks. When Oh became supervisor, the Hawks were unpopular and weak. The hawks, however, became the most dominant and popular team in the Pacific League, presumably due to the competence of Oh.

[6] According to Baseball Magazine (2009), the percentage share of the Hawk's rookies coming from the Kyushu region was 34.9% during 1995-2006 period. On the other hand, during the same period, that of the Giant's rookies coming from Tokyo (the Giant's home) was only 7.6%. Oh also pointed out that during his time as a player, the Giants experienced a drop in support of local fans because they focused too much on gaining nationwide popularity (Nagatani 2005).

[7] Yoshio Higuchi has also pointed out the importance of fostering local star players in the resurgence of baseball's popularity (Ninomiya and Higuchi 2005, p.1973)

[8] Until 2004, each team reported the overestimated attendance number. In 1981 season, the winners of the PL and CL were the Fighters and Giants, respectively. Both teams home was Korakuen Stadium. As stated earlier, the Giants are the most popular team in the JPBL. Further, if an overestimated attendance number is reported, there is no difference of attendance at Korakuen between Fighters and Giants. Based on

available data (Usami 1993), total annual attendance at Korakuen stadium for Fighters' games was 13.7 million whereas for Giants' games it was 29.0 millions. This suggests that attendance data prior to 2005 reflects, to some extent, the real situation. Hence, it is worth while referring to previous reports using JPBL attendance data prior to 2005 (Yamamura and Shin 2008a, 2008b).

[9] Decline in popularity is represented, for instance, in the drop of the program ratings of JPBL games (Yamamura and Shin 2008b).

[10] Examples of substitutes are other professional baseball teams, professional football team's, and other amusement facilities.

[11] It is very difficult to incorporate the ticket price as an independent variable because various types of tickets are sold and therefore prices vary within a stadium (*Puro-yakyu Senshu Meikan,* various years). There are two choices to measure the ticket price. First, as discussed in the literature (e.g., Noll 1974, Schmidt and Berri 2001), there is a way to constructed average price by weighting the ticket prices for each class of seats in each stadium by that class of seat's share of stadium capacity. The scarcity of data about class of seats prevents me from constructing the price data. Second, average realized ticket price can be obtained by dividing ticket revenue by attendance (Kahane and Shmanske 1997). Nonetheless, it is impossible to obtain figures for ticket revenue and therefore to calculate price. Knowles et al (1992), however, asserted that within a given season ticket prices do not vary and therefore omission of price variables would not result in a bias. The sets of prices in each stadium were almost unchanged during the studied period 2005-2007 (*Puro-yakyu Senshu Meikan,* various years). This means that the ticket price of each stadium can be considered to be a time-invariant fixed effect. Accordingly, the fixed effect estimation allows me to control for a price effect since the unobservable stadium specific effects can be controlled for. In addition to price, substitute goods such as other professional sports teams and amusement parks also hardly change during the studied period and can thus be controlled for.

[12] Unfortunately, there is no theoretical model supporting the linear form. It is beyond the scope of this paper to theoretically justify the function form. This is an issue remaining for future study.

[13] For more details, see Greene (Greene1997, p.280).

In the linear model, $y = x'\beta + e$ the elasticity of y with respect to changes in x is

$$\gamma_k = \frac{\partial \ln y}{\partial \ln x_k} = \beta_k \left(\frac{x_k}{y} \right).$$

Values estimated at sample means

$$\lambda_k = \beta_k \left(\frac{\overline{x_k}}{\overline{y}} \right).$$

[14] The record of pitchers in the previous season and their current records prior to the game would be other alternative measures. Nevertheless, these measures are not better than overall records as a proxy for popularity. The reasons are: Japanese pitchers are increasingly moving to the United States to become Major League Baseball players; for example Hideo Nomo, Hideki Irabu, and Daisuke Matsuzaka. If dismissed from a Major League team, some return to JPBL, but do not have a previous season's record in JPBL. In the case of a returnee, the overall records before moving to the United States can be used as a proxy for popularity. There is no current record prior to the first game and therefore the first game is omitted from the sample.

[15] Weather on game day, game time and variable for special promotions can be considered to influence attendance. This paper, however, cannot take into account these factors because of the lack of such data for the JPBL. Hence, special attention needs to be given to the results of this paper.