Team Payroll, Competitive Balance, and Team Performance in the Japan Professional Baseball League: A Study using 1993-2004 Panel Data.

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Team Payroll, Competitive Balance, and Team Performance in the Japan Professional Baseball League: A Study using 1993-2004 Panel Data.

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Abstract

This research aimed to explore how a team payroll has an effect on team performance as measured by the winning percentage using panel data of the Japan Professional Baseball League; separately for each of the Central and the Pacific Leagues.

The major finding is that a team payroll has a remarkably positive impact on the outcomes of Pacific League team performance; however it has none on central League teams.   The reason why such different results are brought about is that the popularity of the Central League decreases the incentive to allocate the resource of teams efficiently with an objective of win maximization.

Key words: Team payroll, competitive balance, team performance

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I. Introduction

Events taken as a threshold point for Japan Professional Baseball League(hereafter abbreviated as JPBL) occurred in 1993 when the free agency system (hereafter abbreviated as FA system) was introduced and the Japan Professional Football League (hereafter abbreviated as JPFL), considered as substitute sport to JPBL, was inaugurated. These events are expected to have changed the environment for the JPBL and therefore would have impacted upon its development. For instance, as discussed later, the payroll has increased over time since 1993 and the winning ratios are expected to be affected by this tendency[1].

Wins of teams are expected to draw the attention of fans, thereby increasing stadium revenue, gate revenue, and operating income. As a consequence, ordinarily, using players efficiently for the purpose of win maximization is likely to result in profit maximization to owners. Therefore, owners give an incentive to and put pressure on managers of teams to win under resource constraints, namely under the condition that the payroll is given. Due to the inception of the FA system, JPBL teams have been able to obtain excellent players from other teams and a player can freely move to his preferred team i if the player is suitably qualified, thereby enhancing the market mechanism within the JPBL. Assuming that the payroll properly represents the ability of the players and that a manager is able to use the talent efficiently, team payroll should have determined team performance[2].

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[1] Recently, researchers have explored the relationship between institutional change and competitive balance (e.g., Butler 2002; Horowitz 1997; La Croix and Kawaura 1999; Schmidt 2001, Schmidt and Berri 2002, 2004).

[2] If the labor market functions efficiently and competitiveness within the league gives rise to motives for team win maximization, the competitive balance thus depends upon

The JPBL comprises the Central League (hereafter abbreviated as CL) and the Pacific League (hereafter abbreviated as PL). Each league consists of 6 teams[3]. The features of CL and PL are remarkably different, which is expressed as the following phrase: 'popularity is for CL, ability is for PL.' The Giants of the CL are the supreme team, much like the New York Yankees in Major League Baseball, luring the fans into the JPBL[4]. Such a "supreme team" effect is convincingly limited to the CL when the Giants play against other teams. That is to say, the revenues for CL teams depend upon the popularity of Giants. Regardless of the Giant's current rank in the pennant race, fans are more likely to attend games when teams play against the Giants. The popularity for Central due to the Giants is likely to enable other CL teams to increase their revenue without efforts being made by themselves; thereby decreasing the competitive pressure and their own incentives to improve the quality of their game(Yamamura and Shin, 2007; 2008). On the other hand, the PL market becomes competitive for the lack of a supreme team such as the Giants, thereby a player's ability is evaluated rightly and managers have an incentive to allocate resources efficiently to maximize wins. This feature of the league is thus expected to affect the relationship between team payroll and outcomes of team performance.

The organization of this paper is as follows: Section II surveys the features of the JPBL and offers the atestable hypothesis and regression function. Then, section

the dispersion of team payroll. Mizak and Stair (2004) suggested that payroll disparity elasticity of win disparity is 0.59 in the National League and 0.66 in the American League.

[3] The number of CL teams has been 6 since 1953 and that of PL since 1958.

[4] Since 1936 the numbers of 29 times victories for the Giants' are one and half times larger than those of the Lions' 19 times, which is second to the top. I see from this that the Giants are obviously dominant in assert supremacy.

III reports the results of the estimation.   Finally, section IV provides a brief conclusion.

II.   Estimation

I now proceed to explore the relationships between payroll and performance.   To this end, I use the panel data of the JPBL for the period 1993-2004[5]. The basic statistics of the variables used in this inquiry and its definition are offered in Table 1[6].   Curves in Figure 1 present trends in the average payroll for the CL and PL.   As shown, the average team payroll rises almost consistently.   Additionally the slope of the series is steeper for CL than for PL; hence the gap of average payroll between them widens by degrees.   The CL teams being forced to spend more than PL ones to garner talent.

Tuning now to Figure 2, I see that the payroll disparity measured by the standard deviation in the CL generally exceeds that in the PL with the exceptions of 1993 and 1994[7].   I compare the maximum and minimum values of the CL payroll with those of

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[5] The reason why I restrict attention to this period is that team payroll data is available from 1993, additionally in 2005 the PL team members changed due to a team merger and a new entrant.

[6] The data were collected from that were collected from Baseball Magazine(2006), http://www.d7.dion.ne.jp/~xmot/kankyaku.htm#00-01,andhttp://jpbpa.net/jpbpa_f.htm?report/index.htm

[7] Various indices have been used to measure competitive balance.   The standard deviation (Quirk and Fort 1992, Schmidt and Berri 2002), Gini coefficients (Schmidt2001; Schmidt and Berri 2001, 2002, 2004; Wiseman and Chattajee 2003), the dispersion and season-to-season correlation of team winning percentage(Butler 2002), the relative entropy approach(Horowitz 1997), the index of dissimilarity (Mizak and Stair 2004), Hirschman-Herfindahl Indices (La Croix and Kawaura 1999) have been

the PL in 2004 in order to check in greater detail.   The highest payroll level is 125 million yen and the lowest 45 million yen among the CL teams[8].   In the PL, 71 million yen and 47 million yen are the highest and lowest, respectively.   This evidence shows that the   payroll disparity difference between the CL and PL is mainly due to the gap between them in the high/low payroll level.   However, with respect to competitive balance, these specific patterns are not observed in Figure 3.   Comparing the curve in Table 2 with that in Table 3, their shapes are very similar in the P, but not in the CL. Moreover, the correlation coefficient between the standard deviation of winning ratios and the coefficients of variation of payrolls is 0.001 for the CL and 0.69 for the PL, suggesting that a remarkable positive correlation exists for the PL but not for the CL.

Cursory examination of total attendances for games, set out in Figure 4, suggests that attendance for CL games is clearly and persistently larger than those for PL. Figure 4 makes it apparent that the CL is far more popular with fans than the PL, which is consistent with the popularity of CL as described in the previous section.

To sum up with the arguments described as above, I postulate the following hypothesis concerning the effects of payroll on team performance.

Hypothesis: It is expected for the PL but not for the CL that team payroll has a positive effect upon the winning ratio.

In line with the discussions above, the regression function to test the hypothesis as above takes the following form:

$WINP_{it} = \alpha_1 PAY_{it} + \alpha_2 ATTEN_{it} + v_i + u_{it}$,

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used as measures for the degree of competitive balance.

[8] The Giants is the team with highest level of payroll.

where $WINP_{it}$ represents the dependent variable in team i and in year t. α's represents regression parameters. v_i, u_{it} represents the unobservable individual specific effects of i 's teams and the error term, respectively. v_i holds the time invariant feature. The structure of the data set used in this study is a panel.

I incorporate *PAY* and *ATTEN* denoting the team payroll and total attendance for games, respectively.   To address potential endogenous problems with independent variables, I carry out fixed effects 2sls estimation (Baltagi, 2005). I use the regional population and the regional real per capita income and the number of championships in the league pennant race as instruments for *PAY* and *ATTEND*[9].   Furthermore, year dummies are included in all estimations to control for time specific fixed effects that, however, are not reported.

III. Results

I begin by looking at Table 2 presenting the results of my estimations about the CL. Column (1) indicates the results of the fixed effects estimation from 1993 to 2004, only to control the unobservable individual specific effects.   Splitting the term into the periods 1993-1998 and 1999-2004, columns (2), (3) report the results of the former and later periods, respectively.   From them it can be seen that the coefficients of *PAY* and *ATTEND* are positive, while being statistically insignificant with the exception of *ATTEND* in column (1).   Turning next to the corresponding results through the fixed effects 2sls model reported in (4), (5), and (6), generally the t-value declined to be statistically insignificant.   These results suggest that CL team payrolls do not have any influence on the winning percent.

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[9] The number of championships in the league pennant race is considered as the predetermined exogenous variable.

Switching attention to Table 3, showing the corresponding results of the CL, it can be seen that all signs of *PAY* are positive and statistically significant in columns (1), (3), despite being insignificant in column (2). Further, its value in (3) is larger than in (1). The results of signs and statistical significance for *PAY* indicated in columns (4), (5), and (6) are unchanged when the edogeniety bias is controlled for by means of the fixed effects 2sls method. What is more, the values of the coefficient become larger than those in columns (1), (2), and (3). As for *ATTEND*, with the exception of column (3), the coefficients are not statistically significant. These results imply that the positive effect of team payroll on the winning ratio becomes remarkably stronger over time, which is in line with the findings of the Major League Baseball League (Wiseman and Chatterjee 2003). The popularity of the JPBL deteriorated when the substitute sport, the JPFL, entered the sports market, especially after Japan played its first game in the Football World Cup in 1998. It was inevitable that the professional sports industry became far more competitive than before 1998. Further, there seems to be some time lag after the introduction of the FA system for it to become firmly established and functioning effectively.

Overall, I interpret the evidence as supporting the hypothesis as presented in the previous section. As well, this is more applicable to the later stage after the start of the JPFL and the introduction of the FA system.

IV. Conclusion

The Japan Professional Baseball League comprises the Central and Pacific Leagues, giving it a similarity of structure to that of the Major League Baseball. The Central League is far more popular than the Pacific League; thus its demand structures appear to be different and therefore affect a team's payroll and incentive to win. However, little is known about the effects of a league's characteristics on the incentive

mechanism.

In this paper, I explore how team payroll has an effect upon team performance as measured by the winning percentage using panel data of the Japan Professional Baseball League for the period 1993-2004; applying it separately for the CL and the PL. Controlling for unobserved team-specific fixed effects and an edogeniety bias, I find that in the CL, team payroll has not affected the outcomes of team performance; on the other hand, in the PL it has had a positive impact. Hence, the disparity in team payroll results in a competitive imbalance in the PL but not in the CL. This seems to be because of the popularity of the CL stemming from the existence of a supreme team decreases the incentive to allocate team resources efficiently with the objective of win maximization.

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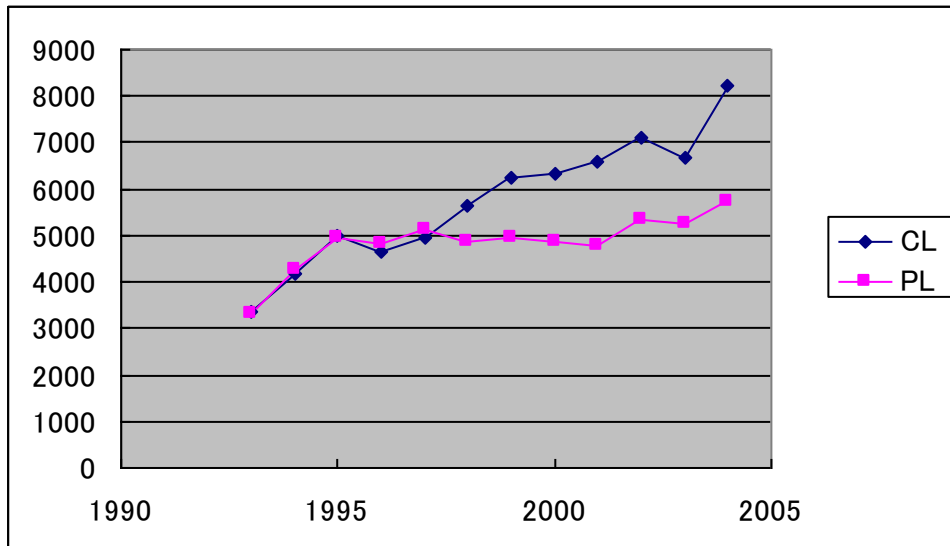
Figure. 1. Average team payroll

Notes: The average wages in the Figures are expressed in ten thousands of yen. The data source is the HP of the Japan Professional Baseball Players Association (http://jpbpa.net/jpbpa_f.htm?report/index.htm).
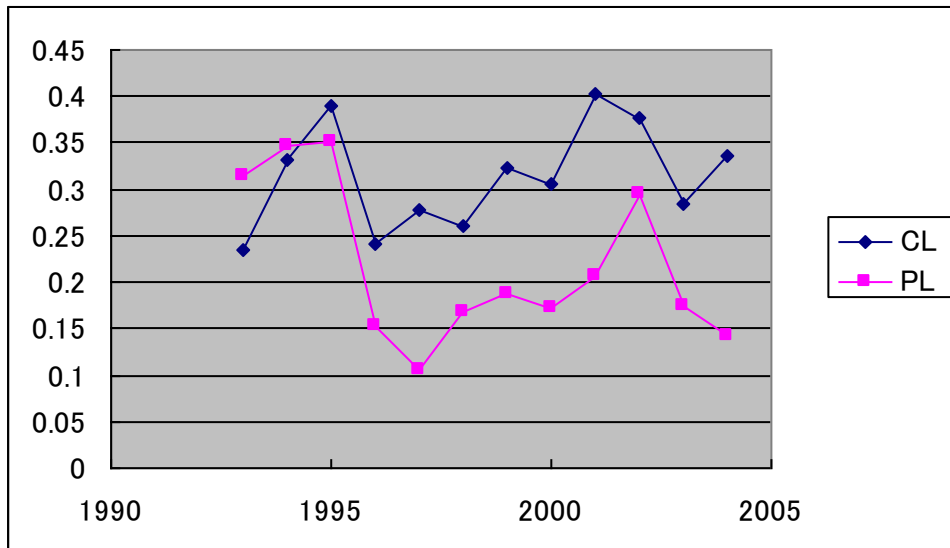
Figure 2. Coefficients of Variation of team wages

Notes: The data source is the HP of the Japan Professional Baseball Players Association
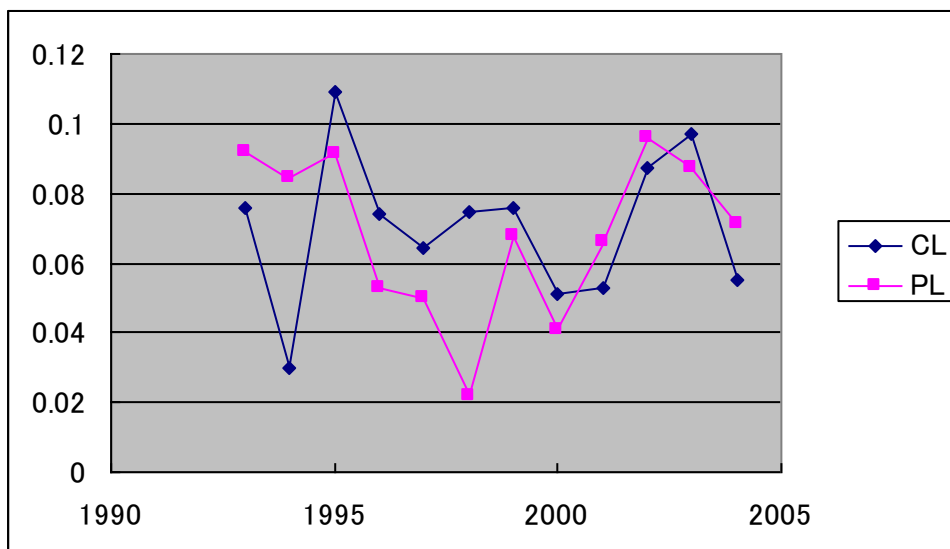(http://jpbpa.net/jpbpa_f.htm?report/index.htm).

Figure 3. Standard Deviations of the Winning Ratio

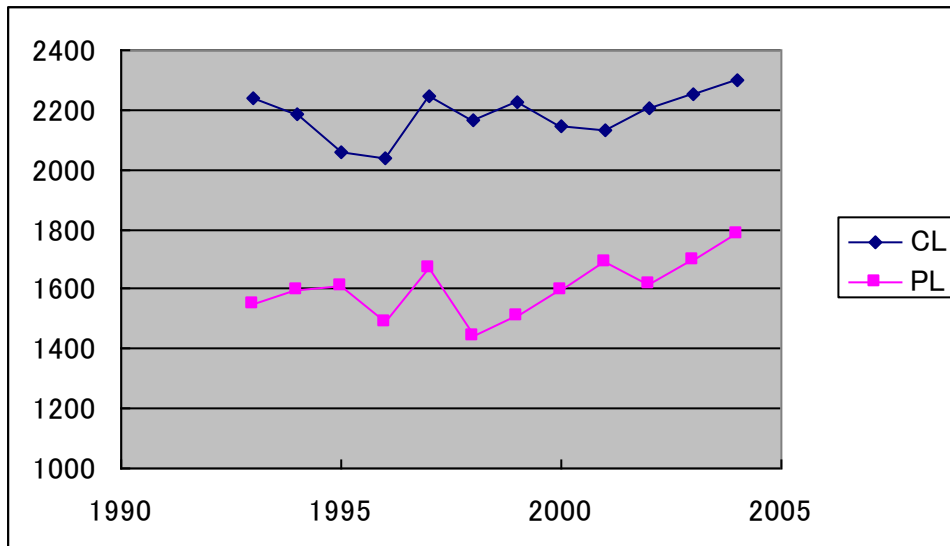*Notes:* The data source is Baseball Magazine(2006).

Figure 4. Average Attendance at Central and Pacific League games

Notes: The data source is http://www.d7.dion.ne.jp/~xmot/kankyaku.htm#00-01.

Table I. Variable definitions, means and standard deviations.

Variables	Definition	Mean	s.d
WINRAT	Winning Ratio	0.49	0.06
PAY	Team Average Payroll (million)	53.0	18.2
ATTEND	Total Game Attendances (million)	18.9	7.6

Notes: Values are simple averages of yearly values over the period 1993-2004. The data source is the HP of the Japan Professional Baseball Players Association (http://jpbpa.net/jpbpa_f.htm?report/index.htm), Baseball Magazine(2006)

Table II. Regression results on the winning ratio (Central League)

Variables	(1) *Fixed*	(2)*Fixed* 1993-1998	(3) *Fixed* 1999-2004	(4)*Fixed 2sls*	(5)*Fixed 2sls* 1993-1998	(6)*Fixed 2sls* 1999-2004
PAY	0.003	0.01	0.06	-0.09	0.05	-0.18
	(0.04)	(0.09)	(0.54)	(-0.26)	(0.04)	(-0.32)
ATTEND	0.23**	0.13	0.17	0.23	0.13	0.25
	(2.81)	(1.14)	(1.63)	(0.72)	(0.09)	(0.58)
Year dummy	YES	YES	YES	YES	YES	YES
Sample	72	36	36	72	36	36
Groups	6	6	6	6	6	6

Notes: Numbers are elasticity calculated by the delta method. Numbers in parentheses are z-statistics obtained by robust standard error. * and ** indicate significance at 5 and 1 per cent levels respectively (one-sided tests). I use the regional population and the regional real per capita income and numbers of championships in the league pennant race as instruments for *PAY* and *ATTEND* in Columns (4), (5), (6) , which are obtained from the Asahi Shinbunsha. (various years). *Minryoku: TODOFUKEN-BETSU MINRYOKU SOKUTEI SHIRYOSHU.* Asahi-Shinbunsha, Tokyo and Baseball Magazine (2006).

Table III. Regression results on the winning ratio (Pacific League)

Variables	(1) *Fixed*	(2) *Fixed* 1993-1998	(3) *Fixed* 1999-2004	(4) *Fixed 2sls*	(5) *Fixed 2sls* 1993-1998	(6) *Fixed 2sls* 1999-2004
PAY	0.22** (2.68)	0.03 (0.31)	0.27* (2.29)	0.47** (3.13)	0.31 (1.39)	0.62* (2.02)
ATTEND	0.08 (1.62)	0.07 (0.67)	0.14* (2.08)	-0.01 (-0.12)	0.06 (0.37)	0.001 (0.01)
Year dummy	YES	YES	YES	YES	YES	YES
Sample	72	36	36	72	36	36
Groups	6	6	6	6	6	6

Notes: Numbers are elasticity calculated by the delta method.   Numbers in parentheses are z-statistics obtained by robust standard error. * and ** indicate significance at 5 and 1 per cent levels respectively (one-sided tests). I use the regional population and the regional real per capita income and numbers of championships of league pennant race as instruments for *PAY* and *ATTEND* in Columns (4), (5),(6) , which are obtained from the Asahi Shinbunsha. (various years). *Minryoku: TODOFUKEN-BETSU MINRYOKU SOKUTEI SHIRYOSHU.* Asahi-Shinbunsha, Tokyo and Baseball Magazine (2006).