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DOES THE NUMBER OF DAYS BETWEEN PROFESSIONAL SPORTS GAMES REALLY MATTER?

Managing a professional sports league involves many responsibilities, including the determination of regular season schedules. We explored seven years of regular season results from the Canadian Football League to determine if the number of days off experienced by a team between games impacts team performance.

Introduction

Sports entertainment is big business. Ticket revenue, food and beverage sales, seat licenses, athletic memorabilia and souvenir sales represent some of the lucrative opportunities in this industry. Successfully managing a professional sports league typically involves such activities as negotiating television contracts, training referees and other officials, achieving and maintaining a reputable brand image, overseeing merchandising opportunities and scheduling games.

Indeed, the scheduling of regular-season matches in a professional sports league has emerged as a topic of clear importance in the sports management literature. Researchers have applied various analytical approaches in the scheduling of games in professional hockey (Costa, 1995), European and South American football (Bartsch, Drexler & Kröger, 2006; Della Croce & Oliveria, 2006; Schreuder, 1992; and Duran et al., 2007), professional basketball (Bean & Birge, 1980) and collegiate basketball (Nemhauser & Trick, 1998).

Notwithstanding the impressive work that has been undertaken with respect to the scheduling of professional sports games, we are unaware of any previous attempts to analytically investigate the equity or fairness of such schedules. Sports fan and media representatives have been known to loudly complain should their favorite team receive any inequity – perceived or otherwise - from a particular regular-season schedule (McCormick, 2009).

A potential source of inequity within a professional sports league could occur when Team A and Team B are scheduled to play one another on a specific day, yet Team A has fewer “days off” prior to this game than does Team B. Should this occur, Team A’s managers, players, coaches and fans may feel that their team is placed in a disadvantageous position for this particular game. Fewer days off may result in Team A being more fatigued, thus potentially less able to earn a victory. Therefore, the “marginal days rest” (the difference in days off for Team A and Team B) may have an impact on team performance.

It is the intention of our paper to investigate the issue of days off between games within a professional sports league. Using seven years’ worth of regular season games from the Canadian Football League (CFL), we plan to analyze whether teams are at a distinct disadvantage should they have fewer days off than their opponents. The next section describes our methods for undertaking this particular

study. We then provide the results of our analysis in the third section and offer some concluding points in the paper's final section.

Method

North American football is a popular team sport. In Canada, the first football teams emerged in the 1860s. The Canadian Rugby Football Union was established in 1884, leading to the formation of the CFL in 1958. Currently, the CFL includes eight teams split geographically between Eastern and Western Divisions. Table 1 lists the current franchises.

Table 1

Current Canadian Football League (CFL) Teams

Western Division	Eastern Division
British Columbia	Winnipeg
Calgary	Hamilton
Edmonton	Toronto
Saskatchewan	Montreal

The CFL operates an 18-game regular season played annually between late June and early November. Playoffs subsequently occur over a three-week period, culminating in the awarding of the Grey Cup, North America's oldest professional football trophy.

Typically, regular season games in the CFL are scheduled on Thursday, Friday, Saturday or Sunday of any particular week. Note that this departs from the approach of the United States' National Football League (NFL) in which games are almost exclusively scheduled on Sundays. Due to the CFL's practice of "spreading out" games over as many as four days in a week, it would not be uncommon for, say, Team A to play Team B on Thursday in week j and then be assigned to play Team C on Saturday in week $j+1$. Team C, meanwhile, may have played its game during week j on a Friday. Consequently, Team A plays Thursday and Saturday in the two weeks, while Team C plays on a Friday and the following Saturday. With one extra day off in preparation for its week $j+1$ game against Team C, Team A may obtain a competitive advantage. Therefore, we note that Team A has a marginal days rest (MDR) value of +1 heading into its game versus Team C.

As a concrete example of this phenomenon, consider the following snapshot of the actual 2007 CFL schedule as provided in Figure 1. Note that Montreal was scheduled to play at Winnipeg in Week 2 on Thursday, July 5th. Montreal then played in Hamilton during Week 3 on Saturday, July 14th. Hamilton, on the other hand, played on Saturday, July 7th in Week 2. This provided Montreal with two extra days off prior to its Week 3 game versus Hamilton. In this particular case, Montreal had a value of $MDR = +2$.

Figure 1**Partial 2007 CFL schedule**

Week 2						
Thu Jul 05	Montreal	23	Winnipeg	32	08:00 PM	29,533
Fri Jul 06	Edmonton	9	BC	29	10:30 PM	32,893
Sat Jul 07	Toronto	30	Hamilton	5	07:00 PM	28,198
Sun Jul 08	Calgary	8	Saskatchewan	49	07:00 PM	25,862
Week 3						
Thu Jul 12	Calgary	15	Toronto	48	07:00 PM	29,304
Fri Jul 13	Edmonton	19	Winnipeg	15	07:00 PM	29,533
Fri Jul 13	BC	42	Saskatchewan	12	10:00 PM	26,981
Sat Jul 14	Montreal	29	Hamilton	20	07:00 PM	21,542

We analyzed results from the 2002-2008 CFL regular seasons (inclusive) to determine the winning percentages for teams exhibiting different MDR values. We defined winning percentage as the percentage of games in which a team with a given MDR earned a victory. Admittedly, we recognize that the outcome of a particular game is not simply affected by the specific MDR. Team strength, obviously, is a factor in game outcome since some franchises are generally more dominant than others within a specific season. Moreover, some teams (e.g. British Columbia) are generally required to travel further distances for road games than, say, an Eastern Canadian team that has numerous opponents within close proximity. British Columbia may, therefore, require an extra day off between games simply due to the logistics and hassles of airline travel. We selected seven years' worth of CFL data in order to mitigate the effects of team strength and travel distance, thus obtaining a stronger indication of the impact of MDR on team performance. It was our initial conjecture that higher MDR values would yield higher winning percentages given the fact that a team with more days off between games than its opponent would be more rested and physically prepared for the subsequent contest. We also felt that positive MDR values would result in winning percentages greater than 0.500 since a team with more days off than its opponent ought to win more times than it loses, *ceteris paribus*.

We analyzed those cases in which a team had a strictly positive MDR heading into a specific CFL game. If both teams had an equal MDR, then the number of days off would be a non-issue for this particular matchup. Moreover, we restricted our attention to MDR values of +1, +2 and +3. Recall that CFL contests are typically scheduled from Thursday through Sunday on any given week. Therefore, the largest MDR value we could observe for teams that play in consecutive weeks would be +3 – this would be the case if Team A and Team B faced each other in week $j+1$, with Team A having played a game on Thursday in week j while Team B played on a Sunday during that week. Therefore, Team A would have three extra days off (Friday, Saturday and Sunday) as compared to Team B for their week $j+1$ matchup.

Results

Table 2 provides the winning percentage results for MDR values of +1, +2 and +3. These winning percentages are also graphically illustrated in Figure 2.

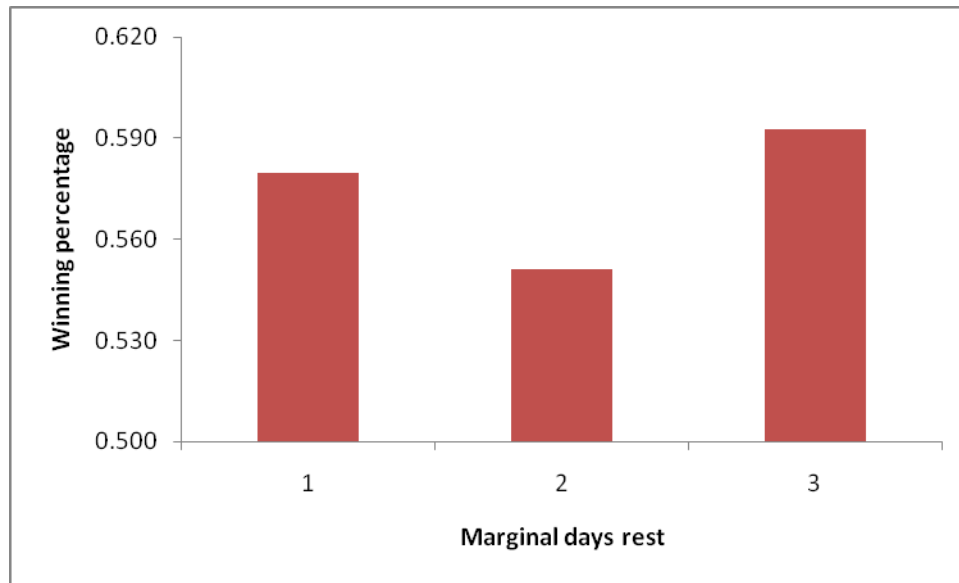
Table 2

Winning percentages for different MDR values

Marginal days rest	Winning percentage	P value
+1	0.580	0.014
+2	0.551	0.183
+3	0.593	0.168

Figure 2

Winning percentage comparisons



Not surprisingly, the winning percentages for the three MDR values are all above 0.500. Therefore, possessing extra days off prior to a game appears advantageous. However, it may be surprising to note that the relationship between winning percentage and MDR is not linear. We had expected a steadily increasing winning percentage as the MDR values rose, but this does not appear to be the case. Although the highest winning percentages are encountered with an MDR of +3, the percentages for +2 are the lowest of the three MDR values analyzed.

In addition, we tested the statistical hypothesis that these winning percentages were statistically different from 0.500, the winning percentage under a null hypothesis of no effect for MDR on team performance. Remarkably, only in the case of MDR = +1 did we obtain statistical significance (at a p-value of 0.014).

We also explored whether there was a significant difference among the winning percentages themselves for the various MDR values. As reported in Table 3, this clearly shows that the winning percentages themselves are not statistically different.

Table 3

Comparing different MDR values

Marginal days rest	P value
+3 versus +2	0.645
+3 versus +1	0.550
+1 versus +2	0.666

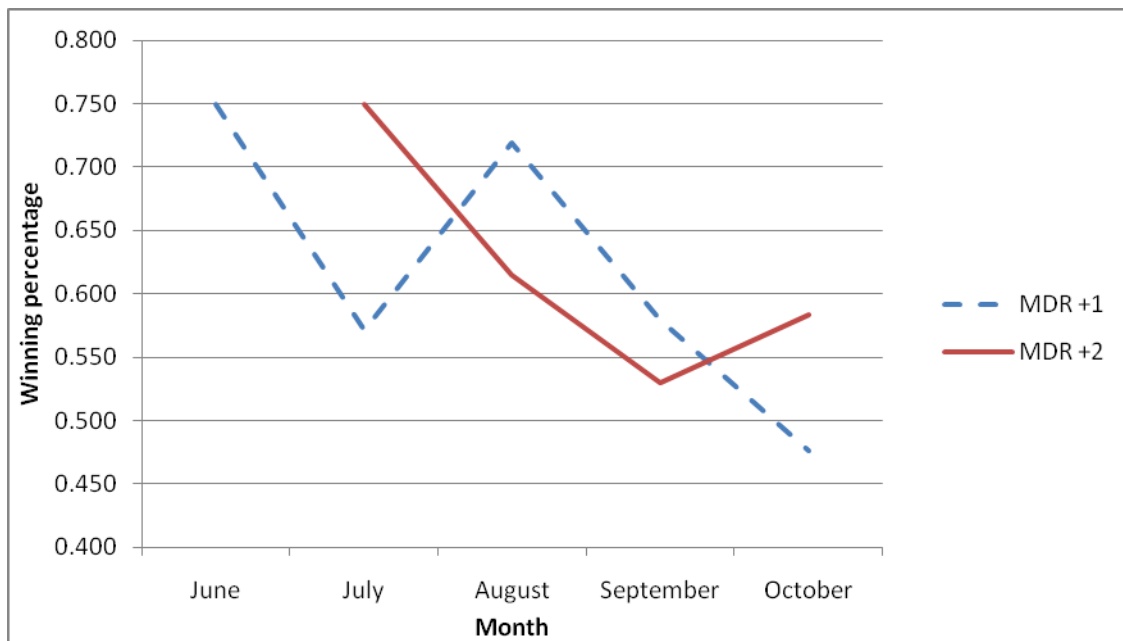
On the whole, this analysis apparently casts doubt on the conjecture that MDR is advantageous to team performance. Although the winning percentages for the three MDR values are all above 0.500, they do not exhibit a linearly increasing pattern. In addition, two of the three winning percentages are not statistically different from 0.500 (the null hypothesis winning percentage). Notwithstanding the complaints that fans, media and team managers may make over perceived inequities, it appears that matchups involving teams with a different number of days off do not generate competitive advantages.

Recall that the CFL regular season lasts from mid-June through early November. As an extension to our data analysis, we explored the impact of MDR on winning percentage as function of the particular month in which a game was played. We pursued this analysis to observe if winning percentages remained relatively consistent throughout a regular season.

Figure 3 illustrates the results. We did not report on MDR values of +3 since there were too few games upon which to draw meaningful conclusions once we partitioned these games into their respective months. For the very same reason, we did not provide results for MDR of +1 and the month of June, nor did we offer any results for November (we note that a CFL regular season concludes by the first week of November, so there are very few regular season games played during this month).

Figure 3

Monthly analysis of winning percentage and MDR



For either value of MDR, the winning percentages display a (generally) downward pattern as the season progresses. For $MDR = +1$, the winning percentage is highest in June before falling in July. Although it climbs in August, it tumbles for the remainder of the year. A similar relationship is observed for $MDR = +2$. The winning percentage falls from July through September, before marginally rising in October.

This is indeed an intriguing pattern. Although we demonstrated earlier that positive MDR when considering the snapshot of an entire season does not offer a statistical advantage, it would appear that the impact of an extra day or two of rest is by no means consistent during the season. Teams that enjoy positive MDR earlier in the season apparently have a greater winning percentage than if this equivalent MDR was obtained later in the year. A possible explanation would be that later in the season, teams may be facing each other for the second or third time during a year. (Since the eight CFL teams play an 18-game regular season, a given team will face the same opponent on multiple occasions). Having already competed against this opponent, a team may be more aware of the other squad's particular strengths, strategies and weaknesses. In the parlance of sports, they would have become "familiar foes". Marginal days of rest would therefore not be as important later in the year. Earlier in the year, the teams would be facing each other for the first time so an extra day or two of rest could yield substantial advantage.

Conclusions

We have analyzed CFL regular season game results from 2002-2008 in an effort to demonstrate whether the difference in the number of days off between games impacts team performance. Teams that have an $MDR = +1$ have a winning percentage significantly different from 0.500, the winning percentage that would be obtained under the null hypothesis of no impact of MDR on game outcome. However, this was the only significant winning percentage we were able to obtain. Contrary to popular perception, there is no increasing advantage for teams that enjoy larger MDR values.

We did observe that MDR is more important earlier in the regular season rather than later in the year. Therefore, when sports managers and league officials are developing schedules, it would be wise to avoid situations in which teams frequently have more days off than their opponents early in the regular season. This would result in a more equitable schedule, one that would not provide consistent advantages for particular teams. Later in the season, the “days off” issue appears less important.

We analyzed the case of a professional sports league that plays a relatively small number of games (18) during its regular season. A possible extension to our work would be to investigate a league such as the National Basketball Association (NBA) or National Hockey League (NHL) in which teams play a larger number of games (a total of 82 in each league). This could provide an additional perspective on whether the number of days off between games truly matters in the outcome of professional sports.

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