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Are Three Points for a Win Really Better Than Two?

Theoretical and Empirical Evidence for German Soccer

Alexander Dilger/Hannah Geyer

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Abstract:

The effects of the three-point rule in first league German soccer are tested empirically and compared to games from the German cup-competition. The inclusion of cup games ensures that changes in league games can be attributed to the three-point rule. As a result of their relative devaluation, the number of draws should decrease. Furthermore, an increase in the number of close wins is expected. The strategy of a leading team becomes more defensive, resulting in fewer goal shootings by that team, as well as fewer shooting opportunities for the opponent. Empirical evidence supporting these effects is found.

JEL Codes: C72, C93, L83

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Sind drei Punkte für einen Sieg wirklich besser als zwei?

Theoretische und empirische Evidenz für den deutschen Fußball

Zusammenfassung:

Der Effekt der Einführung der Drei-Punkte-Regel in der 1. Fußball-Bundesliga wird empirisch getestet und anhand von Pokalspielergebnissen kontrolliert. Der Einbezug der Pokalspiele garantiert, dass vorhandene Änderungen in den Ligaspielen tatsächlich der Drei-Punkte-Regel zugerechnet werden können. Als Ergebnis der Abwertung eines Unentschieden im Vergleich zu einem Sieg sollte die Anzahl der Unentschieden unter der Drei-Punkte-Regel sinken. Des Weiteren wird eine steigende Anzahl enger Spielausgänge erwartet. Führende Mannschaften werden unter der neuen Regel defensiver spielen, was zum einen zu weniger Torschüssen bei der führenden Mannschaft und zum anderen zu weniger Schussmöglichkeiten bei der gegnerischen Mannschaft führt. Empirische Evidenz für diese Effekte wird vorgestellt.

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http://www.wiwi.uni-muenster.de/ioeb/downloads/forschen/paper/IOEB_DP_04_2008.pdf

Westfälische Wilhelms-Universität Münster
Wirtschaftswissenschaftliche Fakultät
Institut für Ökonomische Bildung
Scharnhorststraße 100
D-48151 Münster

Tel: +49(0)251/83-24303 (Sekretariat)
E-Mail: iob2@uni-muenster.de
Internet: www.wiwi.uni-muenster.de/ioeb

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1. Introduction

Before the 1995/96[1] season, the FIFA (Fédération Internationale de Football Association) raised the reward for a victory in football games from two to three points. The main objective of this rule change was to achieve more goals per game, fewer draws and above all, more exciting and attractive matches. Since then, many theoretical and empirical studies have examined the effects of this incentive change and, to some extent, found significant changes in the results of soccer games since the rule change. The question now arises as to whether these changes can actually be ascribed to the introduction of the three-point rule. In addition to the rule change regarding the reward system, a couple of further rule modifications were implemented over the last few years. For instance, the offside rule in German soccer leagues was changed twice and the rules for yellow and red card fouls were tightened. Those rule changes may also have had an influence on the nature of the soccer games. Furthermore, the strategic approach of the teams has changed over the years to a more defensive one. This modified strategy could lead to significant changes in results, which could incorrectly be claimed as an effect of the three-point rule.

In order to control for these possible effects in rule and strategy modifications, this paper draws a comparison between German soccer league matches from 1985/86 to 2004/05 and those of the German cup tournament over the same period. All rule changes that took place in the German soccer league also applied to the cup games (*except* for the three-point rule). In addition, it can be assumed that all strategic changes in team play for league games were also transferred to the cup games. If it were possible to find significant differences between game results before and since the introduction of the three-point rule in league games, compared to

[1] Some countries adopted the new rule before the world-wide introduction, e.g. England in the season 1981/82 or Turkey in the season 1987/88.

the “control group” of cup games, these changes could be attributed directly to the three-point rule.

The next section describes some previous research on the effects of the three-point rule. Then, the theoretical implications of the new rule (Section 3) and the data used (Section 4) are explained. Section 5 briefly outlines the results obtained from data only for the German soccer league. Section 6 describes the method used to compare data from league and cup games, and Section 7 provides the results of these comparisons. Subsequently, Section 8 takes a closer look at the effect of the three-point rule on the level of aggression in the soccer game. The final section provides some conclusions and an outlook for further research.

2. Review of Previous Studies

Over the last few years, numerous publications have dealt with the theoretical and empirical effects of the three-point rule in soccer. For the most part, empirical studies using data from different leagues and (different) time periods often yielded differing and partly even contradictory results.

In the first study to use data from the German soccer league, Klotz and Gerhard (2000) could not find any differences in the number of games ending in a tie or differences in the number of goals per game over the last five years before, and the first five years since the rule change. Therefore, they drew the conclusion that the performance of soccer teams is attributable more to emotions than rational behaviour. In their opinion, the incentive to win is independent of the points that can be gained from such a win.

By contrast, Başlevent and Tunalı (2001) found an increase in the average number of goals per game of nearly one goal, and a strong decrease in the number of games that ended in a tie after the introduction of the three-point rule in Turkey. They analyzed data from the top-level

Turkey soccer league from 1982/83 till 1999/2000, where the rule was introduced before the 1987/88 season.

In their investigation of the Portuguese premier league, Guedes and Machado (2002) studied the effect of the rule change in terms of the playing ability of the teams. Even though only weaker teams played significantly more offensively after the rule change, only stronger teams were able to score significantly more goals per game than before the change. Overall, the number of goals increased between the observed periods of 1994/95 and 1995/96. However, these additional goals were shot by favourite teams, while the number of scored goals shot by weaker teams decreased. The proportion of ties remained nearly unchanged.

Dewenter (2003) conducted empirical tests using Portuguese league data over a longer time period (1934/1935 till 2001/02) and came up with two findings. On the one hand, the average number of goals per game and the goal difference decreased since the introduction of the new rule (compared to the many decades before). On the other hand, the rule seemed to have exerted a negative effect on the home field advantage. Furthermore, the goal difference decreased as a result of the rule change. Dewenter (2003) therefore drew the conclusion that a decline in scored goals seems to make the games less attractive, whereas at the same time, the decrease in home field advantage leads to exciting and less predictable games.

Amann, Dewenter and Namini (2004) provided further indications of a decrease in the home field advantage by means of data from the German soccer league from 1963/64 to 2000/01. The number of goals (goals of the home teams as well as of the away teams) and the number of victories decreased during the time period under examination. While the percentage of home team victories fell significantly, the percentage of away team victories increased significantly. Furthermore, the total number of goals and home team goals declined significantly, while the number of away team goals decreased only insignificantly.

The theoretical model of Brocas and Carrillo (2004) showed that what constitutes the optimal strategy depends on the current score. In the case of a tie, the raise in reward for a win could

lead to more offensive play at the end of the game, whereas a tie at the beginning (and every match starts 0:0) could lead to more defensive play, since the teams try to avoid conceding an early goal. A leading team is enticed to play as defensively as possible, in order to minimize the risk of a goal against it, whilst the losing team will play as offensively as possible, thereby attempting to maximize the chances of scoring a goal. This offensive play of the team being led is independent of the points awarded for a win.

Hundsdoerfer (2004) first considered undetermined effects on the tactic of the teams in theoretical terms. He then shows empirically, that both the average number of goals and the average number of offensive moves in the examined period (1980/81 to 2001/02) in the German soccer league decreased, whereas the average number of minutes without a goal in a game increased. Comparing seven seasons before and since the introduction of the new rule, it is evident that the number of games ending in a tie and especially goalless games, decreased considerably. By contrast, a comparison over a longer time period before the rule change shows an increase in the number of ties. Therefore, Hundsdoerfer drew the conclusion that the data are not suited for showing the effects of the three-point rule.

Shepotylo (2006) examined another aspect of the rule change by means of data from the Soviet and Ukrainian league over the period 1980/81 till 2002/03, and in addition, the Italian Serie A (1993/94 till 2002/03). The increase in points for a win could lead implicitly or explicitly to collusion, since the reward for one victory and one defeat is higher than the reward for two draws. There is a high incentive for collusion in games between teams that are almost equally strong (since the possibility of a draw is very high) and do not compete for the upper ranking positions in the championship. An examination of the Ukrainian league, (however in comparison with the Soviet league before the rule change) showed a substantial decrease in the number of draws, whereas the percentage of home team wins increased. Shepotylo therefore concluded that the introduction of the three-point rule had a positive effect on leagues with highly competitive tournaments, a low level of corruption and a major media. On the

other hand, in countries with substantial corruption and a minimally competitive environment, the incentive for collusion rose significantly through the new rule, especially for weaker teams not competing in the championship.

Garicano and Palacios-Huerta (2006) compared data from the 1994/95 season in the first Spanish soccer league with that from the 1998/99 season and controlled their results with data from the Spanish cup tournament.[2] They investigated mainly the change in the number of unfair situations in game play, especially those leading to a yellow or red card. They argue that the incentive towards unfair play must have increased due to the rule change. In an examination of league games, Garicano and Palacios-Huerta showed that the number of draws and of games with a goal difference of two or more goals decreased significantly, while the numbers of shots on goal and corner kicks, of yellow cards and of games with a goal difference of one increased. Taking into account the cup games, it can be stated that the number of games ending in a tie did not actually decrease, but the offensive manner of play as well as the number of fouls and yellow cards increased. Further consequences of the rule change were the provision of additional time and the fact that attendance (and interest) in the games decreased. Garicano and Palacios-Huerta attributed this to the increased level of unfair play by the teams.

In a review study with data from seven different countries, Aylott and Aylott (2007) demonstrated that the average number of goals per game (with the exception of the German soccer league), as well as the number of draws increased, due to the introduction of the three-point rule.[3]

[2] In order to gain a larger mass of data from cup games, they included the 1993/94 and 1997/98 seasons in their control group of cup games in addition to the 1994/95 and 1998/99 season.

[3] In ice hockey, there was also a rule change in the 1999/2000 season, with respect to the points gained after overtime. Under the old rule, the winner of an overtime game received two points and the loser zero points. Under the new rule, both teams receive one point after the regular game time and the potential winner gains one additional point after the overtime. Banerjee, Swinnen and Weersink (2006) found both theoretically and empirically that the new rule has an effect on the game play during regular time and during overtime. However, while in overtime, the rule change functioned as anticipated by encouraging more offensive play, the effect during the regular game was the converse, as the teams played more defensively under the new rule.

3. Theoretical Considerations and Hypotheses

The aim of introducing the new three-point rule by the FIFA was to make the matches more attractive. The number of games ending in a tie and especially the scoreless games were to be reduced by means of the increase in points for a win and, consequently, devaluation of draws. Indeed, since the introduction of the new rule there is a clear incentive for the teams to avoid a draw, since the former zero-sum-game now means one more point for both teams together if one team wins. This incentive leads to the first and most important hypothesis:

(H1) The introduction of the three-point rule has led to a decrease in the number of games ending in a tie.

Apart from this main hypothesis, four additional hypotheses are to be tested. The model of Brocas and Carrillo (2004) shows that the new rule, particularly at the beginning of the game, provides an incentive to play more defensively in order to avoid an early goal for the other side, which would outweigh an early lead.[4] The following hypothesis can be derived from this greater defensive incentive for both teams at the beginning of the match:

(H2) Games are decided at a later point during the play.

Furthermore, a leading team has always had and still has a strong incentive to play defensively, but this has been increased further, through the introduction of the new rule, since a further goal does not earn any additional points, while losing a goal costs now two points in-

[4] When being led, an (own) goal gains just one point, while a team in the lead loses two points through a goal being won by the opposing team.

stead of one.[5] The team that is losing at that point in time will play offensively, since it is already behind and has nothing to lose. Yet, *ceteris paribus,* this offensive incentive is weaker than the defensive incentive of the leading team, since the team behind gains just one more point by a goal[6], whilst the leading team would lose two points. Additionally, in comparison to the old rule, one point now is less valuable, as it comprises only one third of the possible points for a win and no longer one half. Finally, it is difficult to succeed with an offensive manner of play against a defensive playing team. Therefore, it could be beneficial to conserve the players' strength (and the number of yellow and red cards) for upcoming matches. The greater defensive incentive of the leading team (along with Hypothesis 1 or the higher offensive incentive of a tied score) leads to another hypothesis:

(H3) The goal difference in wins under the new rule is smaller than under the old rule.

Another hypothesis can be derived directly from this one. Accordingly, Hypothesis 4 relates to more closely contested games and to the results of Dewenter (2003) and Amann, Dewenter and Namini (2004):

(H4) The total amount of goals scored under the three-point rule is lower than under the old rule.

As mentioned above, the incentive to win with a large goal difference is essentially lower than the incentive to secure a narrow victory by playing defensively. However, this only holds *ce-*

[5] Only the goal difference between leading and being led team enhances what is normally of subordinate importance. Additionally, more goals of course ensure a win against the opposing team, but if a team attack was the best form of defence, a defensive strategy would make no sense or be identical in effect to the offensive strategy.

[6] The team, however, also wins the option for two more points while under the old rule, only one more point through another goal was possible. Additionally, the opponent team loses two points through the equalisation, which could be useful at the end of the season, but also helps the other teams in the league.

teris paribus. Especially at the end of a season, the number of goals could play a decisive role with respect to the final rankings.

A final hypothesis is therefore intended to confirm or refute the results of Dewenter (2003) and Amann, Dewenter and Namini (2004):

(H5) The home field advantage decreases under the new rule.

The following sections describe the data used to test the five hypotheses and the results of the investigation.

4. Data

In order to examine of the consequences of the three-point rule, in each case, data from ten seasons of the German soccer league, before and after the rule change, are analysed and compared to games of the German cup tournament (DFB-Pokal) for the same seasons. 18 teams participate in the German soccer league and play against each other twice a season (first and second round). Therefore, each season has a total of 306 games, with the exception of the 1991/92 season after the German reunification, when 20 teams participated (380 games).

In the cup tournament, the mode of play changed repeatedly over the period 1985/86 until 1993/94, so that the number of games in each season was not constant over the course of this period (it fluctuated between 66 and 87), but, since the 1994/95 season, 63 games have always taken place. There were differences in the mode of play, not only in the number of rounds played before the eighth final[7], but also in the implementation of a qualification round before the first main round in a couple of seasons and the time in the tournament when the first

[7] In three seasons of the evaluation period, a third round was played additionally to the two main rounds before the eighth final.

league teams took part in the competition. Besides the 1991/92 till 1993/94 seasons[8], 64 teams competed in the first out of two main rounds of every cup tournament. Since the 2001/02 season, all teams from the first division have to play the first main round. Over the entire evaluation period of the cup tournament, the winner of a game proceeded to the next round, whereas the loser had to leave the tournament altogether. The fixtures are drawn by lot before every round. Teams that do not play in the first or second division always have a right to play at home in games against teams from the first or second division. For the entire evaluation period, the cup final took place at the Olympic-Stadium in Berlin.

Especially for teams which do not play in the first division, the cup-tournament always represents one of the highlights of the season. Games against teams from the first division guarantee excellent attendance, as well as revenue from both spectators and sponsors. If the games are broadcast live on TV, the teams earn additional revenues from royalties.

In addition to the final and half-time scores, the goals (for home and away teams) and the time of scoring are analysed. Furthermore, the number of yellow and red cards, as well as (after their introduction in 1991) the number of *second* yellow cards, day and time of the game, number of viewers, and number and time of player exchanges, are surveyed. Overall, in the German soccer league, 6,194 games were analysed over an evaluation period from 1985/86 to 2004/05, as well as 1,353 games in the cup tournament during the same period.

5. Empirical Results from First League German Soccer

In this section, the empirical results are presented for the five hypotheses, using only data from the first league. The analysis differentiates between individual games (3,134 matches under the two-point rule, and 3,060 matches under the three-point rule) and an analysis with aggregated data at the level of teams per season (182 data points under the two-point rule and 180 data points under the three-point rule).

[8] These seasons had three main rounds, teams from the first league did not play in the first round.

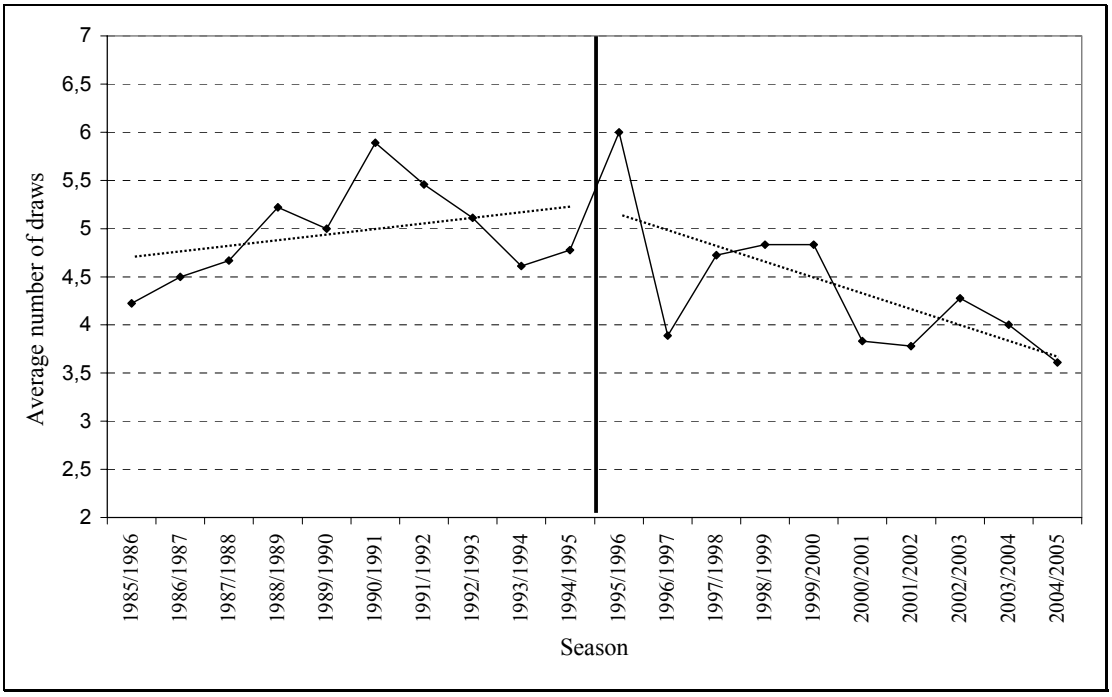
(H1) The introduction of the three-point rule has led to a decrease in the number of games ending in a tie.

An examination of data from the German soccer league shows that the number of games ending in a tie decreased significantly (at the 1 % level) from 29.23 % to 25.75 % of all games. An analysis of the number of draws for each team in one season[9] shows an average of 4.95 drawn games under the two-point rule and a decrease to 4.38 games under the new rule. Replacing the dummy variable (0 = seasons under two-point rule, 1 = seasons under three-point rule) by two time-trend dummies,[10] shows an insignificant rise in the number of draws over the ten years before the rule change and a highly significant (at the 1‰ level) decrease after the rule change. Figure 1 shows the average number of draws for a home team per season.

[9] In order to avoid overlapping, only home team games are analysed. Each team plays 17 games per season at home (19 games in the 1991/92 season, the average numbers are adjusted accordingly) and since 18 teams play in the league (20 in season 1991/92), there are 306 games per season (380 games in the 1991/92 season).

[10] Variable TimeTrend1 takes the value 0 for all seasons since the introduction of the rule, -1 for the last season before the rule change, -2 for the last but one season and so on. Variable TimeTrend2 is 0 for all seasons under the old rule and 1 for the first season after introducing the rule, 2 for the second season under the new rule and so on.

Figure 1: Average Number of Draws per Team and Season.



Especially the number of scoreless games decreased from 8.17 % to 6.93 % (significant at the 10 % level). An examination based on all scoreless games per team and season shows that the goalless games decreased from 1.39 to 1.18 games per team and season, which is significant at the same level. The results of this initial examination suggest that the main objective of the FIFA was achieved, because the introduction of the three-point rule caused a significant decrease in the number of draws and scoreless games.

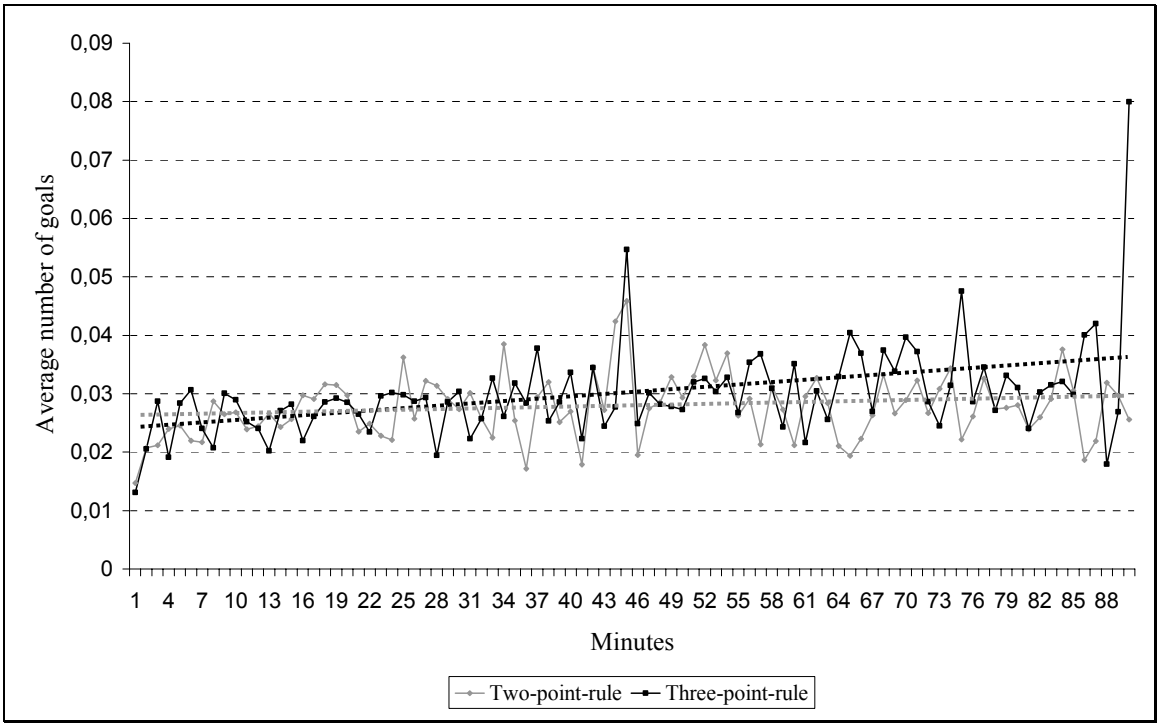
(H2) Games are decided at a later point during the play.

In order to test this hypothesis, the minute of the decisive goal[11] under the old and the new rule is compared. Under the two-point rule, the decision on the point allocation is made in the 43.78th minute of the game on average while the decision happens almost two minutes later (45.48th minute) under the new rule. This change in the time of decision is significant at the 5 % level.

[11] In terms of the final goal that converts a potentially tied game into a game with a leading team or vice versa.

Other evidence to support the hypothesis of later goals and thus games being decided later, is provided in Figure 2, which shows the goals per minute in draws played under both the two and three-point rules. The plotted regression lines demonstrate that the possibility of an early goal in a currently prevailing draw under the two point rule is greater than under the three-point rule. However, after the 22nd minute, the possibility of scoring a goal where there is a draw situation under the new rule is and remains higher until the end of the game, where it is especially high.

Figure 2: Average number of goals per minute scored from a draw situation

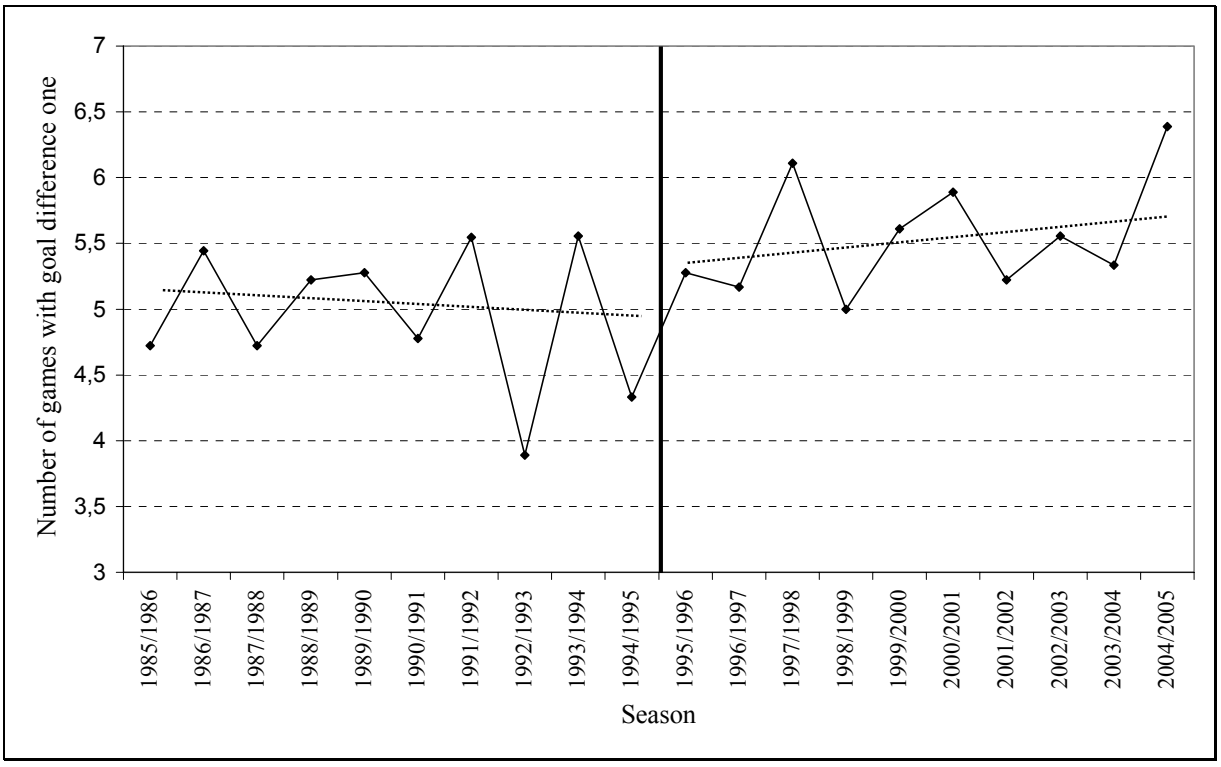


(H3) The goal difference for wins under the new rule is smaller than under the old rule.

The empirical data show a significant decrease at the 1 ‰ level of the goal difference in games that ended in a win from 2.02 to 1.91 goals per game. The number of games won with a difference of only one goal is another indication of more closely contested games under the new rule. The percentage of these games increased from 29.20 % to 32.68 % of all games

(significant at the 1 % level). While the average number of games with a goal difference of one was 4.96 per season and per home team under the old rule, now averages 5.56 games per team and season end, with a goal difference of one under the new rule (also significant at the 1 % level). An examination of the two time trend variables shows only a barely observable decrease under the two-point rule, but a significant increase (5 % level) under the three-point rule as Figure 3 illustrates.

Figure 3: Number of games with a goal difference of one



(H4) The total amount of goals scored under the three-point rule is lower than under the old rule.

With respect to the results of the more narrowly contested games, an obvious assumption is a decline in the number of goals per game. As already stated, the incentive to win with a large goal difference is smaller than the incentive to protect a tight lead by playing more defensively. The data, however, do not confirm this assumption. Indeed, the average number of

goals per game declined from 2.93 to 2.87, but this decrease is not significant. While the number of home-team goals decreased significantly from 1.79 to 1.70 goals per game (significant at the 1 % level), the number of away-team goals increased insignificantly from 1.14 to 1.17 goals per game.

(H5) The home field advantage decreases under the new rule.

Finally, the change in the number of home and away-game wins is analysed. Since the number of games that ended in a tie decreased, the number of wins consequently had to increase. The data analysis showed an insignificant decrease of home-team wins from 49.23 % to 48.50 %, but a significant increase of away-game wins from 21.54 % to 25.75 % (significant at the 1 ‰ level). In conformity with some of the other studies presented in Section 2,[12] this result is evidence of a decline in home field advantage.

6. The Estimation of "Difference-in-Differences"

In order to verify whether the detected relationships really are effects of the three-point rule, the results of Section 5 are compared with those for the German cup tournament during the same period. For this purpose, a so called "Difference-in-Differences estimation" (DID) is used.[13] This DID-method entails an OLS-regression with three dummy-variables as independent variables.[14]

To test the hypotheses listed above, the following model is estimated:

$$z_i = \beta_0 + \beta_1 x_i + \beta_2 y_i + \beta_3 x_i y_i + e_i,$$

[12] Dewenter (2003) and Amann, Dewenter and Namini (2004).

[13] Abadie (2005).

[14] For an overview of the implementation of regression-methods with dummies, see Hardy (1993).

where z_i is the corresponding dependent variable for game i, $x_i = \begin{cases} 1, & \text{for league games} \\ 0, & \text{for cup games} \end{cases}$,

and accordingly $y_i = \begin{cases} 1, & \text{for games under three-point-rule} \\ 0, & \text{for games under two-point-rule} \end{cases}$.

e_i represents the residues, i.e. the deviation between the expected and the actually observed value.

Due to the four occurring combinations of the independent variables, the following expected values for the dependent variable are possible:

Table 1: Expected values of the dependent variable of the regression

	League	Cup	Difference
1985/86-1994/95	$\beta_0 + \beta_1$	β_0	β_1
1995/96-2004/05	$\beta_0 + \beta_1 + \beta_2 + \beta_3$	$\beta_0 + \beta_2$	$\beta_1 + \beta_3$
Difference	$\beta_2 + \beta_3$	β_2	β_3

The regression coefficient β_0 indicates the expected value of the dependent variable for cup games under the two-point rule, since $\beta_0 = \hat{z}_i$ (expected value of z_i) subject to the condition that all independent variables are 0. β_1 computes the difference between the mean values of league and cup games before the introduction of the new rule, since β_1 displays the change of $\hat{z}_i$ for a change in x_i from 0 to 1. Accordingly, $\beta_1 + \beta_3$ shows the difference between the mean values of the league and cup games after the introduction of the three-point rule. The differences in means between cup games before and since the rule-change are represented by β_2 and the corresponding differences in league games by $\beta_2 + \beta_3$. The most interesting aspect of this examination is the coefficient β_3, because it represents the interaction effect between

the kind of game (league or cup game) and the date of game (before or since the three-point rule). Therefore, β_3 computes the "real" effect of the three-point rule.

While performing the "difference-in-differences estimation" (DID), some assumptions of this method must be considered. DID makes the assumption that there would not have been any change in the relevant data for the cup games without the introduction of the three-point rule.[15] This notion is, of course, an oversimplification in some cases, as some results in the following section demonstrate quite clearly. Since all teams competing in the cup tournament play at the same time under the three-point rule (since its introduction) in their respective leagues, the rule could influence the nature of play in the cup games by changing the training or the selection of team members.

7. Empirical Results of the Estimation of "Difference-in-Differences"

Before analysing the cup games and comparing the results to those of the league games, some peculiarities of the cup tournament should be clarified. All games in the cup tournament lead to the elimination of the losing team from the tournament. Therefore, each game must end in a win for one of the two teams. If a game ends in a tie after 90 minutes, an overtime of 30 minutes is played. Until the 1990/91 season, a game that ended without a winner after overtime had to be repeated at a later date.[16] If the replay also ended in a tie after 90 plus 30 minutes, a penalty shoot-out followed. Since 1991/92, any game that ends in a tie is decided by a penalty shoot-out.[17]

[15] For further assumptions of the method and a critical discussion, see Bertrand, Duflo and Mullainathan (2004).

[16] Except for the cup-final, which was decided by a penalty shoot-out, if it ended in a tie after 120 minutes.

[17] Before the abolishment of the replay game, it was conceivable that both teams could be content with the tie, if the match was tied shortly before the end of the overtime, because they would have a replay game which brought additional revenue. A survey did not reveal a significant change in the number of games that ended in a tie after 120 minutes before and since the season 1991/92.

An additional particularity of the cup tournament is the participation of teams that do not play in the first soccer league. Presently, each team from the second division, and 28 teams from the third or lower divisions, qualify for the first round of the cup tournament.[18] By means of drawing the fixtures in each season, different numbers of games between a team from the first division and teams from lower divisions are played. Furthermore, the number of games between two teams from lower leagues before and since the rule change, have varied. This could create a problem in interpreting home and away-team wins, since teams from the third or lower divisions usually have the right to play at home against teams from the first or second division.

The number of games between two teams that do not play in the first league decreased significantly at the 5 % level under the new rule, while the number of games between two teams of the first league and the number of games between a first league team and a team from lower leagues did not change significantly before and after the introduction of the three-point rule. In order to interpret the results, it must be kept in mind that potential differences between the number of home and away-team wins, in comparison to the league games, could result from these changes.

The results of Section 5 are now evaluated in comparison with results from the cup tournament. With respect to the total number of goals, only the first 90 minutes of the cup games are analysed, so as to facilitate a comparison with league games. For the analysis of

- the percentage of draws,
- scoreless games,
- goals in the last two minutes,
- the percentage of games with a goal difference of one,

[18] For a more precise description of the qualifying-mode, see http://www.dfb.de/index.php?id=160547, last viewed on 21.02.2008.

- the goal difference in games that did not end in a tie and the
- percentage of home and away-team wins,

also data from overtime are included, if an overtime was necessary.

Before comparing league and cup games by the DID-method, a short overview of the results with only cup data is presented. In this overview, only those results are included which yield a significant change in relation to the analysis of the league games.[19]

Unlike the league results, the number of draws in cup games increased insignificantly from 10.51 % to 12.38 %, while the number of scoreless games decreased insignificantly from 3.18 % to 2.70 %. In line with the results of the league games, the games are decided at a later point in time. The point of decision moves from the 44.19th minute (on average) to the 46.67th minute, but this change is not significant. The percentage of games ending with a goal difference of one increased insignificantly from 35.96 % to 39.84 % and the goal difference in games that did not end in a tie increased insignificantly from 2.14 to 2.21 goals. Additionally, the total number of goals scored in a game decreased insignificantly. Whereas, under the two-point rule, an average of 3.31 goals was scored, the average number of goals under the new rule was 3.22. A significant decrease occurred in the number of home-team goals achieved, which decreased from 1.46 to 1.25 goals per game. The number of away-team goals increased only insignificantly from 1.86 to 1.97. Another significant change (at the 5 % level) can be observed in the percentage of home-team wins which decreased from 37.90 % to 32.38 %, whereas the percentage of away-team wins increased insignificantly from 51.04 % to 54.44 %. As mentioned, the percentage of away-team wins of all games is substantially higher in the cup tournament in contrast to the league tournament, resulting from the special characteristics of the play mode in the cup tournament. In comparison to the league games, the results displayed in Table 2 and 3 emerge.

[19] The results of this analysis can also be seen in the row "Rule" in Table 4.

Table 2: Percentage of relevant variables of all games

		Two-point rule	Three-point rule
Percentage of draws	League	29.23 %	25.72 %
	Cup	10.51 %	12.38 %
Percentage of scoreless games	League	8.17 %	6.93 %
	Cup	3.18 %	2.70 %
Percentage of games with goals in the last two minutes	League	12.03 %	15.00 %
	Cup	16.46 %	16.83 %
Percentage of games with a goal difference of one	League	29.20 %	32.68 %
	Cup	35.43 %	39.84 %
Percentage of home-team wins	League	49.23 %	48.5 %
	Cup	37.90 %	32.38 %
Percentage of away-team wins	League	21.54 %	25.75 %
	Cup	51.04 %	54.44 %

Table 3: Mean and standard deviation of examined variables

		Two-point rule		Three-point rule	
		mean	standard dev.	mean	standard dev.
Number of goals shot in the last two regular minutes	League	0.12	0.340	0.16	0.380
	Cup	0.17	0.390	0.17	0.391
Goal difference in games that ended with a winner	League	2.02	1.154	1.91	1.038
	Cup	2.14	1.557	2.21	1.581
Home-team goals	League	1.79	1.416	1.70	1.339
	Cup	1.46	1.466	1.25	1.231
Away-team goals	League	1.14	1.125	1.17	1.135
	Cup	1.86	1.706	1.97	1.860
Total goals	League	2.93	1.767	2.87	1.711
	Cup	3.31	2.128	3.22	2.075

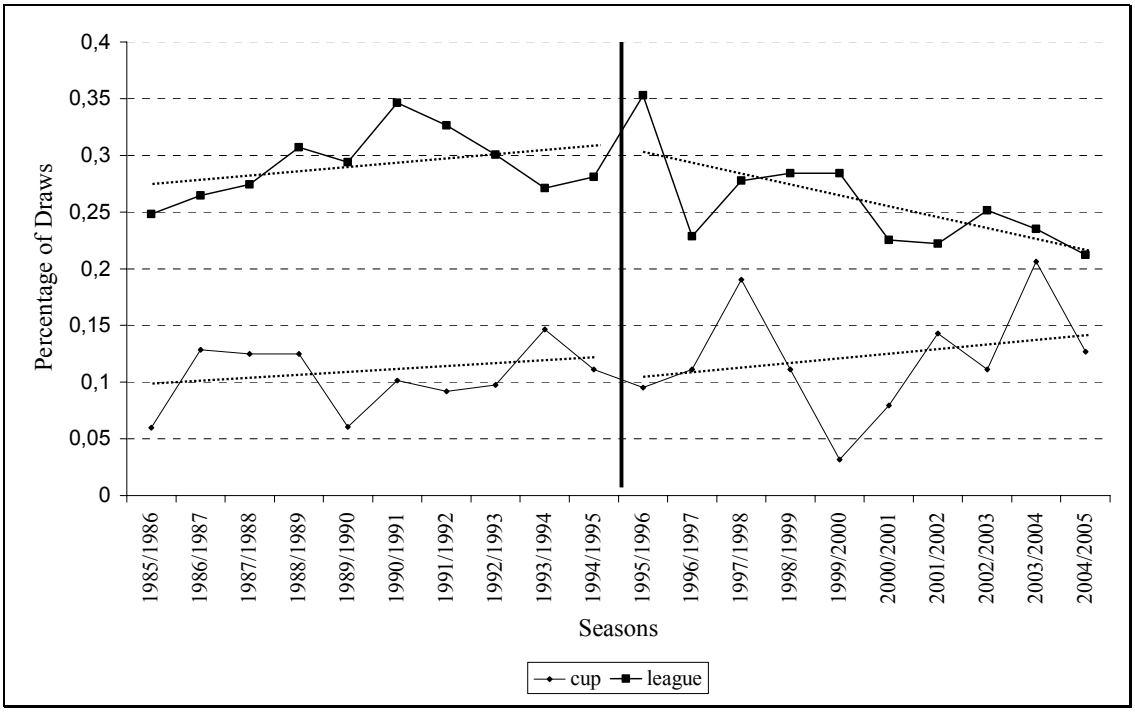
The analysis of the cup results shows that a comparison of the percentage of home-team wins, as well as home-team goals in cup and league tournament cannot be estimated with the DID-method, since the assumption of no change in the cup data is not fulfilled. The other results permit an application of the DID-method, since they fulfil the assumption of no change before and since the introduction of the three-point rule.

The following comparison of league and cup games differentiates between analyses at the levels of absolute figures and of percentages. While the examination of the number of goals, as well as the goal difference in games that ended with a winner, are presented in absolute figures, the number of draws, scoreless games, games with a goal difference of one and home and away-team wins are presented in percentages. This examination with percentages is necessary, since the number of games in a cup season is much lower than the number of league games and additionally changes from time to time (between 63 and 87 games per season). In the following section, the hypotheses from Section 5 are tested:

(H1) The introduction of the three-point rule has led to a decrease in the number of games ending in a tie.

By comparing the percentage of draws per season in league and cup tournaments before and since the introduction of the three-point rule, the DID-method shows a significant decrease in the number of draws in league games at the 10 % level.

Figure 4: Percentage of draws in league and cup games.



In this analysis, a slight increase in the percentage of draws in cup games since the 1995/96 season is noticeable. This is contrary to the conceivable assumption that teams adapt their strategy and game-play from league to cup game. Based on the fact that the increase in the percentage of draws in cup games is the normal trend without a rule change in the reward system, the decrease in the percentage of draws in league games under the new rule is even stronger. The decrease of 3.51 percentage points is actually a decrease of 5 percentage points, compared to the trend in cup games.

Unlike this significant change, the number of scoreless games decreased only insignificantly in comparison to the scoreless games in the cup tournament.

(H2) Games are decided at a later point during the play.

Compared to the results of the cup games, the shift in the decisive play caused by the three-point rule is no longer significant. This shift is even greater in cup games than in league matches.

(H3) The goal difference in wins under the new rule is smaller than under the old rule.

The decrease in the goal difference in decided games is confirmed by the cup games. The decrease caused by the three-point rule is significant at the 10 % level and, with 0.181 goals per decided game, even greater than the actual decrease in league games. This is due to the fact that the goal difference in cup games increased, while the goal difference in league games decreased. The percentage of games with a goal difference of one also increased significantly at the same level, in comparison to the cup data and amounts to an increase of 7.4 percentage points.

(H4) The total amount of goals scored under the three-point rule is lower than under the old rule.

In line with the results of the league data, the inclusion of the cup data reveals no significant influence of the three-point rule on the total number of goals scored, which increased insignificantly by about 0.03 goals per game. Since the analysis of cup games showed a significant decrease in the number of home-team goals, a comparison with league games is not possible, as the assumptions of the DID-method are not fulfilled. The increase in away-team goals in cup games is higher than in league games (0.11 goals per games, compared to 0.02 goals). Therefore, the increase caused by the three-point rule is not significant. However, the reason with respect to the cup games seems to be different, namely the higher share of first-league teams visiting teams of lower leagues.

(H5) The home-field advantage decreases under the new rule.

A comparison of league and cup home-team wins by means of the DID-method is not possible, since the assumption of no change in cup games is not fulfilled. The number of away-team wins increased in comparison to the cup games by 0.8 percentage points. This increase

is, of course, not significant. In this respect, the question arises again of whether a comparison of the percentage of home and away-team wins between league and cup games makes sense, because in cup games, underdogs mostly play at home against favourites. Therefore, a possible home-team advantage has to be evaluated in a different manner to a home-team advantage in league games.

In Table 4, all results of the comparison of league and cup games using the DID-method are summarised.

Table 4: Results of the DID-method

	Percentage of draws	Percentage of scoreless games	Decisive minute[+]	Goal difference in games that ended with a winner[+]	Percentage of games with a goal difference of one	Number of away-team wins
Tournament	0.187***	0.050***	-0.403	-0.115**	-0.103***	-0.295***
	(0.018)	(0.008)	(1.243)	(0.066)	(0.023)	(0.016)
Rule	0.016	-0.004	2.485	0.067	-0.038	0.034**
	(0.018)	(0.008)	(0.020)	(0.091)	(0.023)	(0.016)
Effect	-0.050*	-0.008	-0.794	-0.181*	0.074**	0.008
	(.025)	(0.011)	(1.781)	(0.097)	(0.033)	(0.023)
(Constant term)	0.105***	0.031***	44.187***	2.139***	0.394***	0.510***
	(0.012)	(0.006)	(1.128)	(0.062)	(0.017)	(0.011)
N	40	40	7547	7547	40	40
R^2	0.830	0.655	0.001	0.007	0.370	0.950

"Tournament" is described by the dummy-variable *x*, that is, the difference between league and cup tournament. "Rule" stands for the dummy-variable *y*, the variable which measures the difference between cup games under the two and the three-point rule. Finally, "Effect" describes the net-effect of the three-point rule.

*Significant at the 10 % level, ** significant at the 5 % level, *** significant at the 1 % level.

[+] Since the data for these examinations are heteroscedastic, a White-estimator is used.

8. Does the New Rule Make Matches More Unfair?

From their analysis of the three-point rule, Garicano and Palacios-Huerta (2006) draw the conclusion that the new rule makes the game more aggressive, as the number of warnings in the form of (yellow and red) cards increased significantly. In our examination, an analysis only with data from league games seems to make no sense, as there was some tightening-up of the rules for yellow and red cards over the last twenty years, which could also have contributed to an increase in the number of yellow and red cards. The inclusion of cup data now allows an examination of the three-point rule effect on the number of yellow and red cards.[20] Therefore, the number of yellow and red cards in games with overtime is multiplied by ¾ to facilitate a comparison with the number of cards in league games.[21] Since all the rule changes took place in league and cup tournament (except for the introduction of the three-point rule), an examination of the yellow and red cards is now possible and worth conducting. Therefore, a sixth hypothesis can be introduced:

(H6) Under the three-point rule, the number of yellow and red cards has increased.

A comparison of the change in the number of yellow cards by means of the DID-method is not possible, since the number of yellow cards, subdivided into yellow cards for the home and away teams, changed significantly in both the league and the cup games over the course of time, due to the abovementioned rule-tightening over the last twenty years. Therefore, an analysis with the help of time-trend variables should now show the effect of the three-point rule on the number of yellow cards. In line with the time-trend examination of Section 5, two time-trend variables describe the change in the number of yellow cards of home teams in the course of seasons. The analysis shows that all changes are significant at the 1 ‰ level, except

[20] A possible change in the number of second yellow cards is not examined, since the second yellow card was introduced only after 1991.

[21] This calculation of the number of yellow and red cards for games over 90 minutes is necessary, since the exact time of the warnings are not available.

for the Variable TimeTrend2 in league games, which is significant at the 5 % level. In this context, the trend lines are of interest (see Figure 5). While under the old rule, the number of cards increased due to the rule tightening almost parallel in league and cup matches, under the new rule, the number of cards declined considerably in cup games, while it stagnated at a high level in league games. A possible interpretation of these different developments in league and cup games could be that the teams react to the rule tightening and avoid situations that lead to warnings in cup games. In league games however, the introduction of the three-point rule leads to more aggressive play, despite the risk of a warning.

Almost traditionally, the average number of yellow cards for away teams is higher than that of teams which play at home. Apart from that, the analysis of the number of yellow cards for the away teams yields similar results. The total of cards increased under the old rule in league and cup games, while it declined in cup games, and stagnated in league games under the new rule, as Figure 6 depicts. However, in contrast to the yellow cards of home teams, the Variable TimeTrend2 is not significant for cup and league games.

For an analysis of the number of red cards, divided into cards for the home and the away team, the DID-estimation is again a possible method, as the change in the number of red cards in cup games before and since the rule change is not significant. However, the number of red cards in league games shows no significant increase, compared to that of cup games. This could be due to the low number of red cards per game. On average, only 0.10 red cards under the old rule and only 0.11 red cards under the new rule were found in league games. In cup games, on the other hand, 0.10 cards were found before and since the new rule was introduced.

Figure 5: Average number of yellow cards of the home team in league and cup games.

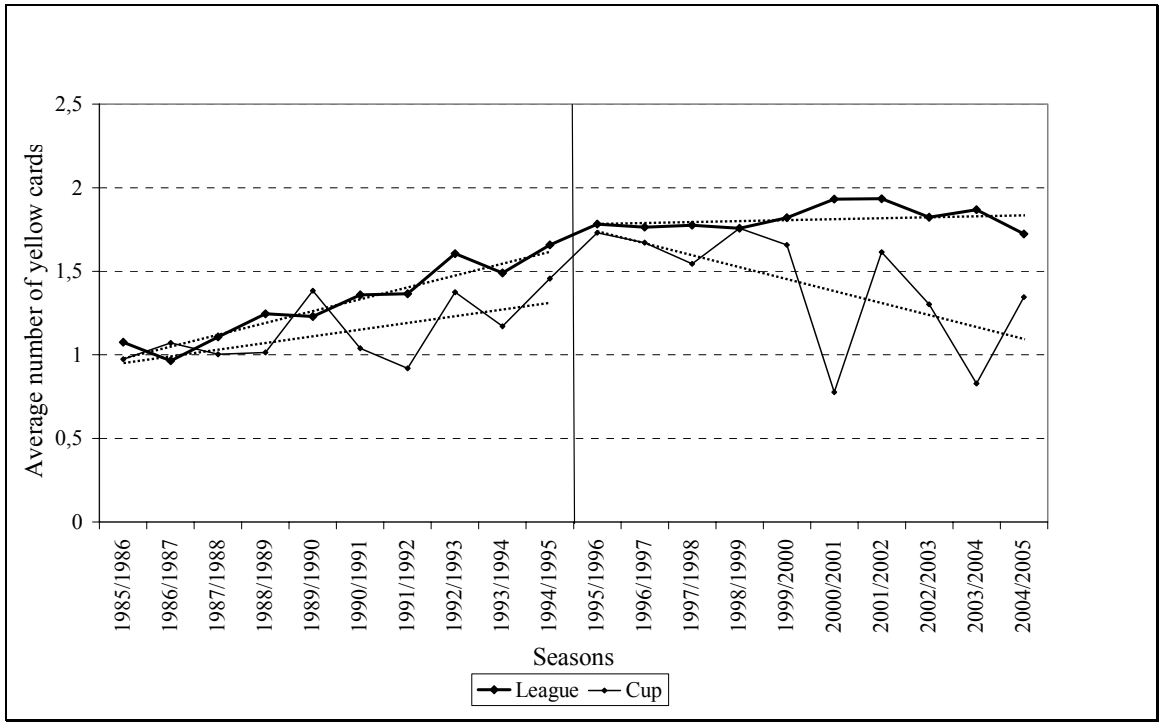
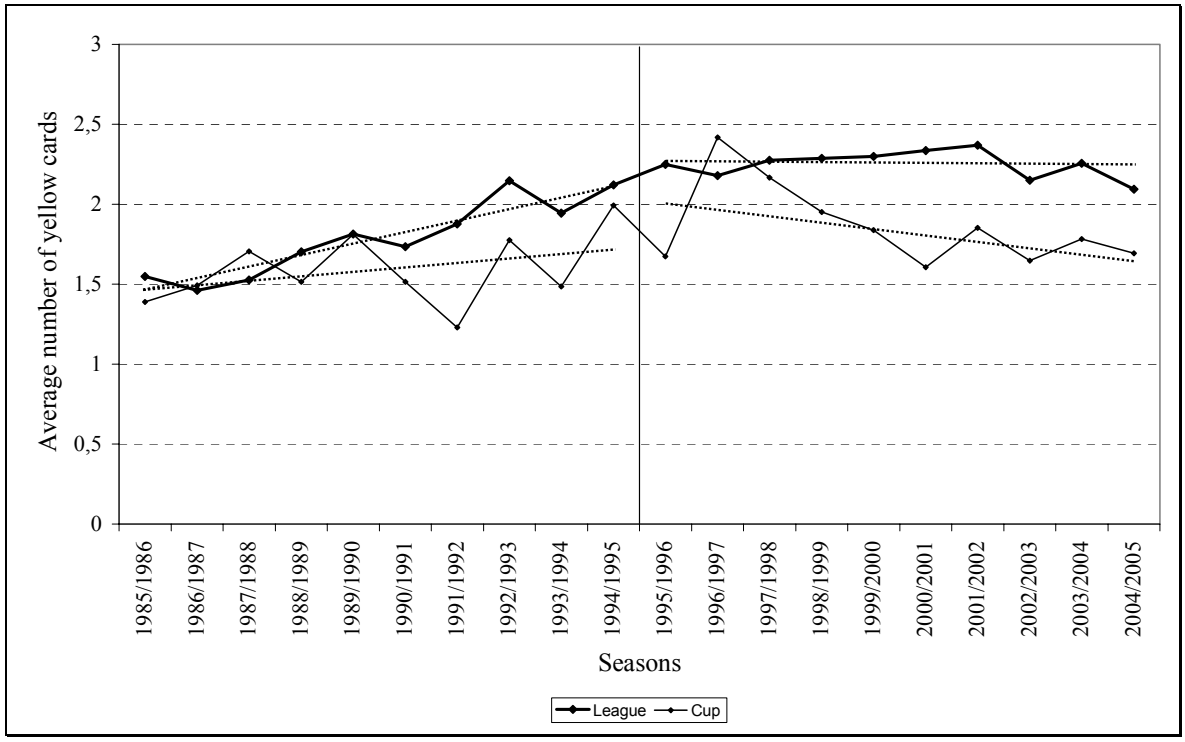


Figure 6: Average number of yellow cards of the away team in league and cup games.



9. Conclusions and Outlook

The comparison of the league results with data from the German cup tournament shows that the influence of the three-point rule on game play in the German soccer league is not as strong as could be expected from the results of an analysis based on league data only. The main argument in favour of the rule change was the decrease in games ending in a tie. This aim was achieved, as the comparison with the relevant cup data shows. The percentage of games that ended in a tie decreased significantly, even when compared with cup data. The effect of the three-point rule on the goal difference is a counterproductive result of the comparison. The introduction of the rule affects this aspect, as the comparison with cup games confirms. While the goal difference in decided games decreased, the percentage of games that ended with a goal difference of one increased. This can be explained by the fact that teams are not interested in a win with many (useless) goals. If they are the leading team, they will play very defensively and attempt to defend the lead, instead of playing offensively and trying to score more goals. Another ambivalent fact is the increase in the number of yellow cards, which is also significant in comparison with the cup data. The introduction of the new rule seems to cause more aggressive play. The other significant changes that occurred in league data before and since the three-point rule could not be attributed directly to the three-point rule. The fact that the three-point rule could have an influence on game play in the cup tournament cannot be excluded in this context. Since all teams that play in the cup tournament stick to the three-point rule in their league games, it is possible that they transfer their playing strategy from league to cup games. The significant results with respect to the percentage of draws or the number of yellow cards, for example, contradict this aspect.

The fact that teams from lower divisions participate in cup games is problematic for the interpretation of results. Although this concern is somewhat allayed, because they played in the cup tournament before and after the introduction of the new rule, the significant difference in the number of games between first league teams before and after the 1995/96 season shows

that this aspect has to be considered. A restriction of cup games to only those in which first league teams participate, would be too limiting, since there were only 220 games between first league teams in the evaluation period (between 4 and 18 games per season).

Therefore, an interesting starting point for further investigation would be a weighting of the games according to the division to which the participating teams belong. For example, a goal scored by a first league team against a team from the fourth division could be weighted less than a goal shot against a first league team, but the exact weighting seems less clear.

A further interesting aspect could be the examination of fouls that were not punished by issuing a yellow or red card, but rather by a free kick for the opposing team. If the introduction of the three-point rule really has an influence on aggressiveness in play, the number of fouls in league games should increase to a greater extent than those in cup games.

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Westfälische Wilhelms-Universität Münster
Scharnhorststraße 100
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