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## Raising the Scores? : Empirical Evidence on the Introduction of the Three-Point Rule in Portugese Football

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# **Raising the Scores?**

## **Empirical Evidence on the Introduction of the Three-Point Rule in Portuguese Football**

Ralf Dewenter

# Raising the Scores?\*

## Empirical Evidence on the Introduction of the Three-Point Rule in Portuguese Football

Ralf Dewenter<sup>†</sup>

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### Abstract

This paper provides an empirical analysis on the effectiveness of incentives when pay-offs were changed. Using data on Portuguese first division football matches the effects of the introduction of the so called three-point rule are analyzed applying panel count data techniques.

**JEL-Classification:** C23, C25, L8, L83.

**Keywords:** Sports economics, Football, Incentives, Count data.

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# 1 Introduction

The effectiveness and consequences of incentives is an interesting field for economic research. Especially pay-offs play an essential role for strategic behavior and it is of special interest to analyze effects of changing rewards. Unfortunately, corresponding data concerning field experiments are only hard to find. Nevertheless, because of the existence of competitive situations and strategic behavior in contests, and also because of the availability of data, (team) sports provide an appropriate area for both empirical and theoretical analyses. Prominent examples for such investigations are Dixit (1987), Ridder, Cramer and Hopstaken (1994) or Boyd and Boyd (1995).<sup>1</sup>

A further interesting example for analyzing the effectiveness of incentives is the change of the pay-off system by the FIFA (international football association) regarding national and international football matches.<sup>2</sup>

Correia Guedes and Machado (2002) analyze the influence of the three-point system on the attractiveness of the Portuguese first football division, both theoretically and empirically. As a main outcome of their case-study they find some positive effects on the offensiveness of underdogs in general. The favorites, in contrast, scored a higher number of goals. Moreover, if the asymmetry between the team strength is large enough, the introduction of the three-point rule results in less attractive matches, because now underdogs defend to a larger extend than before.

The focus of Correia and Machado is on attractiveness of football matches and the differences between strong and weak teams. This paper, in contrast, expands the analysis by addressing the question whether home and away teams scored more or less goals induced by the introduction of the three-point rule. Or, more exactly, if the three-point rule has changed the outcomes of the matches

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<sup>1</sup>Other publications concern with the demand for football matches (see for example Czarnitzki and Stadtmann 2002), the home advantage (see Dobson and Goddard 2001) and, for example, with outcome forecasts (see Kuypers 2000). Amann, Dewenter and Emami Namini (2002) analyze the effect of the three-point rule, using data on the German Bundesliga.

<sup>2</sup>By the introduction of the so called three-point rule in 1995, the FIFA raised the pay-off for a winning football team from two to three points. However, the pay-off for a draw (one point) remained unchanged.

and affected the home advantage significantly. Hence, this paper analyses if the three-point system is an incentive for teams to change their strategies.

The next section summarizes some characteristics of the Portuguese first football league to give an understanding of its peculiarities. Section 3 discusses the data and the results from the empirical analysis. Section 4 concludes.

## 2 The Portuguese Premier Football League

In comparison with other national football associations the Portuguese is a rather small one. Even though the premier league consists of 18 teams since 1988/89, only a limited number of teams is successful over the last years. As a matter of fact, the most successful teams Sporting CP, SC Benfica and FC Porto have played in the first division over the whole period since 1934, and all of the other teams have been relegated at least for one season (see table 1). Only few teams have remained in the first league for most of the time (e.g. VSC Guimarães, CF Belemenses, VFC Setúbal, SC Braga, Boavista FC or Académica) and many of the others have played only half of the seasons or less in the first division.

The superiority of the three leading teams is also evident from the cumulative table (see Table 1), that summarizes all matches, goals and points (assuming a two point system) from 1934 to 2002. For example, SC Benfica scored 4651 goals, Sporting CP scored 4301 and FC Porto 4198, respectively. The next team, CF Belenenses, scored only 2913 goals. Moreover, also the number of points achieved shows some evidence for the superiority of the top 3.

Futhermore, and in contrast to other European leagues, the Portuguese first division has played all seasons since 1934, because of Portugal's special role during World War II. The season 1934/35 started with 8 teams. In 1939 the league has been increased by at first two teams and later by two further teams. In the seventies there have been 16 teams in the first division and for two seasons in the late eighties the league consists of 20 teams. Since 1989 the Portuguese premier league constantly consists of 18 football teams.

**\*\*\* Insert Table 1 about here \*\*\***

## 3 Empirical Evidence

### 3.1 Data

The data used in this study are extracted from the internet database “Futebol Português em Números”. The site includes information on the team names, the match results and the ending tabular from 1934 up to now. Unfortunately, information on the attendance figure or the team performance and strategy are not available.

The sample used for this study includes information on all matches from 1934/35 to 2001/02. In this period 66 different teams have joined the first Portuguese division and 13919 matches have been carried out. Overall, 2102 groups can be identified, regarding a specific match (e.g. Boavista FC vs. FC Porto) as a cross-sectional unit. Therefore, using panel methods group specific effects like home advantage or stadium size can be controlled for. The endogenous variables used in this study are the number of goals (*goal*) scored during a match, subdivided into goals scored by the home team (*hgoal*) and the away team (*agoal*).

Furthermore, the variables *hrank* and *arank* measure the position in the league of the home and away team in the last season for each match. Thus, a long-run measure of team performance can be used to control for asymmetric strengths. Short-run performance variables are *hgoalt* and *agoalt* which are the number of goals scored by the home and away team during the last match. The variables *hwint* and *awint* are dummies which are equal to unity if the home and the away team have won the last match. Finally, the dummy variable *TPR* represents the transition to the three-point system.

### 3.2 Results

A first test of the influence of the TPR has been carried out by simple descriptive statistics. Typically, home teams score more goals than away teams which can be interpreted as some kind of advantage of playing at home.

\*\*\* Insert Table 2 about here \*\*\*

Calculating the means of the endogenous variables under both regimes (see table 2) shows also some evidence for the existence of a home advantage. The average number of goals is always higher for the home team. Moreover, under the regime of the three-point system, the average number of goals declined, even if the average number of away goals decreased by a relative small number. Hence, as a first result, the introduction of the TPR seems to have had some negative effect on the home advantage.

Neglecting any exogenous influences like a changing environment or the strength of the teams the above statistics are, of course, only a rough measure. Therefore, pooled count data regressions (see Winkelmann 2000) have been calculated, where *hgoal*, *agoal* and *goal* have been regressed on the exogenous variables *arank*, *hrank*, *hgoalt*, *agoalt*, *hwint*, *awint*, a constant and time dummies. Since the number of goals is an integer value, count data models are appropriate methods. Because of the restriction of the Poisson distribution negative binomial models have been applied.

Negative binomial model have been carried out, to analyze the influence of the TPR, since the number of goals scored are naturally count data.<sup>3</sup> In all of the regressions (see Table 3) the regime switching seems to have a negative impact on the endogenous variables and surprisingly the impact on away teams seems to be more distinctive than on home teams. However, since the partial regression coefficients can not be interpreted the same way as in linear regressions, calculating the marginal effects at the sample means lead to different outcomes. Here, the effect of introducing the TPR yields an average reduction in home goals by -0.85 and only by -0.60 for away goals. Thus, again, there is some evidence that away teams seem to suffer less from the TPR than home teams do.

**\*\*\* Insert Table 3 about here \*\*\***

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<sup>3</sup>For all regressions the overdispersion tests support the hypothesis that the negative binomial models are valid procedures. All  $\alpha$ 's have small but statistically significant values. However, even the use of Poisson models came to nearly identical parameters estimates.

The former performance of the teams (if significant) has positive influence on the number of goals scored. Only the former wins of the home team seems to have negative effects on contemporary goals scored by home teams, which is a bit contradictory.<sup>4</sup>

As mentioned above, some further information is available, if the panel structure of the data is considered. Therefore, conditional negative binomial fixed effects regressions (see Winkelmann 2000) have been calculated using specific matches as groups.<sup>5</sup> More exactly, each match with the same team pairing over the different seasons is assigned to the same group.

**\*\*\* Insert Table 4 about here \*\*\***

The results of the respective regressions support the former outcomes. Again, TPR seems to have negative effects on the goals scored (see table 4). However, the marginal effects are surprisingly higher for away teams than for home teams. Hence, considering specific matches over time does not support the hypothesis that the home advantage has been reduced by the regime switching.

Altogether, the result support the outcomes of Correia Guedes and Machado (2002). Because, if the data is corrected by differences in team performance, the TPR has rather led to a support of the favorites. This is probably due to a more defensive strategy of the underdogs.

Interestingly, using a subsample including all matches since the league consists of 18 teams (since 1989/90), an obvious reduction of the home advantage has been detected. More exactly, a statistically significant increase in *agoal* and *goal* and a insignificant increase of *hgoal* has been identified using negative binomial and fixed effects negative binomial methods (see the last row of table 4). Hence, controlling for changing strategies over the long period of 60 years leads to measurable positive effects.

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<sup>4</sup>Additionally, a dummy variable *dbos* representing the so called “Bosman Law” has been introduced but without any significant effect.

<sup>5</sup>Also random effects models have been analyzed but Hausman specification tests support models with fixed effects in each case (see table 4).



### 3.3 Some further results

Taking into account that many football matches end with a zero goals draw, zero inflated negative binomial and zero inflated Poisson and negative binomial models have been analyzed to account for a possible zero inflation. However, even if the hypothesis of zero inflation could not be rejected the results have not changed significantly. Hence, the outcomes of the above models are robust against the variation of models.

Furthermore, the difference in goals scored by the home and the away team has been analyzed in order to determine the effect of the regime switching. Therefore, a variable *goaldif* has been built which is the absolute value of the difference of home and away goals. Using fixed effects count data models has shown that also the difference in goals decreased due to the invention of the three-point rule. Since, home teams on average scored a higher number of goals this can also be interpreted as some evidence for the reduction of the home advantage.

To analyze the influence of the TPR on the probability of a win conditional logit regressions have been carried out using the dummy variables *win*, *hwin* and *awin* as endogenous variables. However, the variable *TPR* had a statistically significant influence on the probability to win a match only for *awin* in the reduced sample at the 10% confidence level. Seemingly, the scores have been affected by the TPR but not the outcomes.

## 4 Conclusion

The aim of this paper was to analyze the effects of the introduction of the three-point rule in the Portuguese major football league on the outcomes of the matches. As the regime switching can be interpreted as some kind of changing pay-offs it is interesting to analyze data on football matches as a case-study for the effectiveness of incentives.

Even more than the results produced by Correira Guedes and Machado (2002), the empirical evidence support the hypothesis that the matches have become more boring instead of getting more interesting, since the number of goals scored de-

creased with the application of the TPR. This outcome holds regardless whether home or away teams are considered. Hence, the total number of goals have also declined. Using a reduced sample produces different results. Regarding a time span from 1988 to 2002 empirical evidence for a reduction of the home advantage exists.

Thus, if the number of goals can be interpreted as some kind of measure for attractiveness, football matches in Portugal have become less attractive since 1934. Nevertheless, football matches have become more exiting with the introduction of the TPR. However, even if the probability to win a match has not been changed significantly, the home advantage has been reduced.

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# A Tables

Table 1: Cumulative table of all teams

Rank	Team	Matches	Wins	Draws	Defeats	Goals	Points
1	SL Benfica	1852	1261	349	242	4651-1696	2871
2	FC Porto	1852	1194	339	319	4198-1789	2727
3	Sporting CP	1852	1154	384	314	4301-1810	2692
4	CF Belenenses	1724	753	407	564	2913-2184	1913
5	VSC Guimarães	1672	651	394	627	2463-2463	1696
6	VFC Setúbal	1526	557	349	620	2261-2321	1463
7	Boavista FC	1338	540	313	485	1880-1922	1393
8	SC Braga	1376	471	327	578	1797-2117	1269
9	Académica	1260	410	245	605	1903-2394	1065
10	CS Marítimo	732	245	206	281	812-916	696
11	SC Farense	754	222	191	341	796-1093	635
12	SC Salgueiros	740	197	183	360	804-1377	577
13	GD CUF	610	207	148	255	829-1004	562
14	Atlético CP	632	192	134	306	976-1285	518
15	SC Beira Mar	636	167	177	292	653-1005	511
16	Varzim SC	584	159	170	255	600-862	488
17	GD Estoril Praia	542	163	139	240	774-913	465
18	Leixões SC	580	162	135	283	668-1067	459
19	FC Barreirense	592	166	119	307	758-1195	451
20	GD Chaves	446	131	123	192	492-619	385
21	Portimonense SC	410	134	101	175	431-527	369
22	CF Estrela Amadora	382	105	131	146	390-458	341
23	SC Covilhã	406	126	79	201	585-834	331
24	SC Olhanense	366	115	69	182	662-848	299
25	Lusitano Évora	364	116	64	184	494-722	296
26	Rio Ave FC	354	100	94	160	353-508	294
27	Gil Vicente FC	344	98	91	155	335-471	287
28	UD Leiria	298	103	77	118	320-386	283
29	SC Espinho	354	96	91	167	336-523	283
30	FC Penafiel	332	86	97	149	262-442	269
31	FC Tirsense	256	65	73	118	219-370	203
32	FC Paços Ferreira	170	51	54	65	185-221	156
33	FC Famalicão	196	53	48	95	205-346	154
34	COL Oriental	190	50	37	103	224-438	137
35	CF União Madeira	174	41	54	79	150-250	136
36	SC Campomaiorense	170	48	34	88	186-287	130
37	SCU Torreense	164	44	31	89	183-316	119
38	UFCI Tomar	172	43	33	96	178-331	119
39	Elvas CAD	146	37	37	72	211-283	111
40	FC Alverca	136	38	32	66	159-217	108
41	CD Nacional Madeira	110	27	37	46	110-155	91
42	Leça FC	124	33	25	66	120-231	91
43	CAF Viseu	128	27	24	77	81-237	78
44	Caldas FC	104	26	25	53	124-235	77
45	Amora FC	90	22	23	45	90-143	67
46	CD Montijo	90	23	20	47	91-155	66
47	AD Sanjoanense	104	16	22	66	86-249	54
48	CD Santa Clara	68	16	20	32	67-96	52
49	Lusitano VRSA	78	21	9	48	94-210	51
50	Carcavelinhos FC	82	19	12	51	103-223	50
51	Unidos Lisboa	54	18	8	28	151-145	44
52	Académico Porto	82	18	6	58	137-300	42
53	CD Aves	64	11	18	35	56-110	40
54	CD Feirense	90	13	13	64	70-197	39
55	SL Elvas	48	17	3	28	108-167	37
56	AD Fafe	38	9	14	15	29-47	32
57	FC Felgueiras	34	8	9	17	29-47	25
58	Seixal FC	52	7	8	37	44-150	22
59	GD Riopele	30	6	9	15	23-51	21
60	RD Águeda	30	7	5	18	25-55	19
61	CF União Coimbra	30	5	7	18	22-54	17
62	GC Alcobaça	30	4	7	19	20-56	15
63	FC Vizela	30	4	7	19	31-71	15
64	União FC Lisboa	14	3	2	9	30-49	8
65	UD Oliveirense	22	3	2	17	22-73	8
66	Casa Pia AC	14	1	0	13	12-56	2

Table 2: Average number of goals

System	Mean	Std. Dev.	Freq.
GOALS			
2 Point system	3.07	2.14	11777
3 Point system	2.56	1.65	2142
HGOALS			
2 Point system	2.00	1.80	11777
3 Point system	1.56	1.31	2142
AGOALS			
2 Point system	1.07	1.20	11777
3 Point system	1.00	1.08	2142

Table 3: Negative binomial regressions of goals

Endogenous Variable	HGOAL	AGOAL	GOAL
Exogenous Variable / Model	NBREG	NBREG	NBREG
TPR	-0.6057 (-5.74)	-0.8217 (-6.47)	-0.6688 (-7.95)
ARANK	-0.0494 (-26.30)	0.0470 (20.75)	-0.0145 (-9.75)
HRANK	0.0465 (25.22)	-0.0542 (-20.55)	0.0129 (8.38)
HGOALT	0.0064 (6.15)	0.0014 (1.03)	0.0053 (6.12)
AGOALT	-0.0433 (-3.00)	0.0027 (1.45)	-0.0037 (-3.10)
HWINT	-0.0083 (-2.15)	-0.112 (-2.18)	-0.0102 (-3.17)
AWINT	-0.0252 (-4.95)	0.0238 (3.99)	0.0088 (2.19)
Constant	0.9799 (11.03)	0.6722 (6.26)	1.5336 (21.44)
Time Dummies	YES	YES	YES
$\alpha$	0.0384	0.0217	0.0506
Prob( $\alpha$ )	0.0060	0.0102	0.0045
Wald $\chi^2$	5079	2995	3075
ME(TPR)	-0.85	-0.60	-0.72

Note: Robust standard errors are calculated using the Huber-White sandwich estimator, corresponding z-statistics are given in brackets.

Table 4: Conditional negative binomial regressions of goals

Endog. Var.	HGOAL	AGOAL	GOAL
Exogenous Variable / Model	CNBREG-FE	CNBREG-FE	CNBREG-FE
TPR	-0.4527 (-3.67)	-0.5831 (-4.00)	-0.4471 (-4.48)
ARANK	-0.0430 (-17.00)	0.0422 (14.27)	-0.0079 (-3.97)
HRANK	0.0975 (16.70)	-0.0429 (-12.89)	0.0130 (6.69)
HGOALT	0.0018 (1.58)	0.0015 (0.95)	0.0020 (2.07)
AGOALT	-0.0044 (-2.83)	-0.0016 (-0.80)	-0.0041 (-3.12)
HWINT	-0.0003 (-0.08)	-0.085 (-1.46)	-0.0043 (-1.20)
AWINT	-0.0026 (-0.45)	0.0087 (1.26)	0.0058 (1.25)
Constant	4.4761 (9.76)	12.0063 (0.13)	3.5192 (23.32)
Time Dummies	YES	YES	YES
Nobs	13262	13090	13312
No. of groups	1484	1421	1500
Avg Obs per group	8.9	9.2	8.9
Wald $\chi^2$	1654	1016	1472
Hausman	247	117	119
ME(TPR)	-0.45	-0.58	-0.44
Reduced sample			
TPR	0.0859 (1.10)	0.3930 (3.87)	0.3106 (4.87)

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