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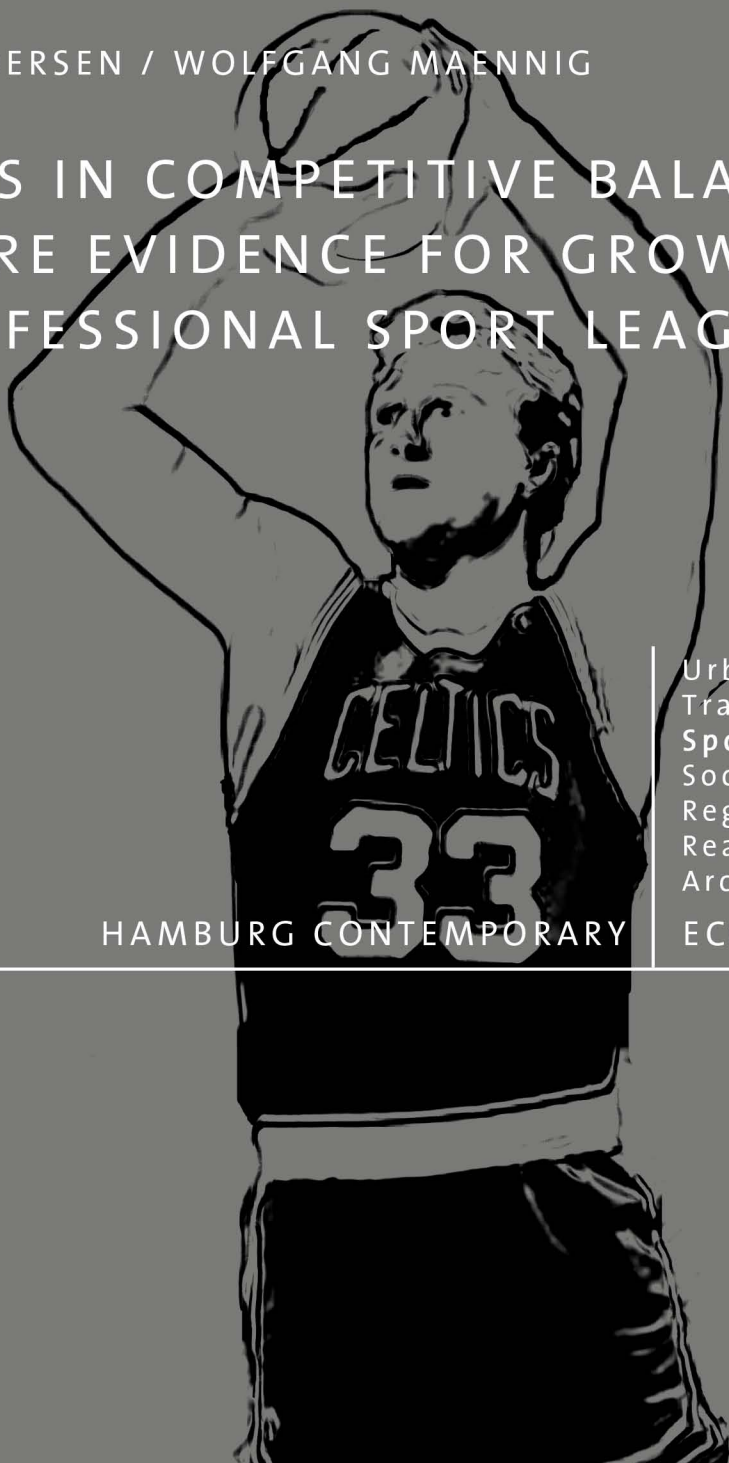


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TRENDS IN COMPETITIVE BALANCE:
IS THERE EVIDENCE FOR GROWING IMBALANCE
IN PROFESSIONAL SPORT LEAGUES?



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Trends in Competitive Balance: Is there Evidence for Growing Imbalance in Professional Sport Leagues?

Abstract: The concept of competitive balance is a central aspect in the literature of sports economics. A popular argumentation of sport functionaries is that dominance of one or a few teams could lead to unequal incomes for the clubs, restrictions in the clubs' ability to improve sporting performance and ultimately to a loss of attractiveness and loss of income for the league. Following this line of reasoning and alleging a negative trend in competitive sports functionaries often try to implement regulations in team sport leagues. The aim of this paper is to analyze for eight different leagues if there is such a trend existing. For an empirical test for trends in competitive balance of four European soccer leagues (ENG, ESP, GER, ITA) and four US Major Leagues (MLB, NBA, NFL, NHL), OLS regressions with a constant were carried out. For the entire observation period from 1969/70 to 2003/2004, of 48 trends ascertained, only 12 could be observed as being significantly positive (i.e. growing imbalance) with 19 significantly negative (i.e. growing balance). The remaining 17 trends were insignificantly different from zero.

Keywords: Competitive Balance, Sports Economics, Team Sport Leagues, Trend

JEL classification: L83, C22

Version: January 2005

1 Introduction

One of the central particularities in the production system of sports leagues is the fact that the clubs are in competition with each other on the input markets but are obliged to cooperate on the output market, i.e. the league enterprise. In order to maximise common output, there are calls in some areas to ensure an optimal competitive balance in the leagues. The dominance of one or a few teams could lead to unequal incomes for the clubs, restrictions in the clubs' ability to improve sporting performance and ultimately to a loss of attractiveness and loss of income for the league. In order to avoid this spiral, many sports associations have created rules and instruments to provide for a financial and/or competitive balance between the individual teams. These include the distribution of incomes, reserve clauses and/or drafting systems and salary caps.

To implement more regulations Sports functionaries – especially in Europe – often argue that there is a negative trend in competitive balance in professional team sport leagues. The aim of this paper is to analyse for eight different leagues if there is such a trend existing. In Section 2 we start by discussing alternative measures of competitive balance and its empirical representations in European football leagues, including the English Premier League, the Italian Serie A, the Spanish Primera División and the German Bundesliga, and also US-American Leagues such as the NBA (National Basketball Association), the NFL (National Football League), the MLB (Major League Baseball) and the NHL (National Hockey League). In Section 3 an empirical test for trends in competitive balance will be carried out to examine whether there are trends in the different sequences of competitive balance measures for the eight leagues or not.

2 Indicators of Competitive Balance and their Empirical Representations

The individual final league standings for the various team sport leagues provide a good basis for the calculation of competitive balance in the sense of uncertainty of seasonal outcome. This also applies to the US-American Major Leagues, in which the position in the final league table of the regular season merely determines whether or not a team will participate in the subsequent post season, in which the championship is decided in playoff mode: a good ranking in the final league table is important in order to have supposedly “easier” opponents as well as home advantage in the playoff matches.

A number of different ranking criteria were used for the calculation of final positions in the various final league tables. The US-American Major Leagues, which for the most part do not permit match draws, tend to use winning percentage to determine league table position. By contrast, the European football leagues and the NHL calculate on a points basis. Empirical analyses of European football leagues also have the additional problem to deal with the fact that by the

1995/96 season at the latest the points procedure was converted from the 2-point rule to the 3-point rule.¹

In order to test whether the winning percentage used in most US leagues lead to significant deviations from historical rankings in an empirical analysis, the historical results of all European football league games in the seasons from 1969/70 to 2001/02 were evaluated using not only the 2-point system, but also the 3-point and winning percentage systems. Table 1 shows initially that the correlation of points according to the 2 and 3 point rules as well as the winning percentage never falls below 0.995 (and incidentally is not significantly different from 1).

Tab. 1 Correlation Coefficients of Ranking Criteria of Various Point Allocation Rules of the European Soccer Leagues

	Points			Positions		
	3PR	2PR	MW	3PR	2PR	MW
3PR	1.000	0.995	0.995	1.000	0.986	0.986
2PR	0.995	1.000	1.000	0.986	1.000	1.000
SQ	0.995	1.000	1.000	0.986	1.000	1.000

Source: Own calculations.

The correlation of the final league table positions that would have resulted from the historical football match results on the basis of the different ranking criteria is also very high at 0.987.² Even if individual exceptions do exist,³ as an interim result we may say that – for historically existing match results – the selected ranking criteria had hardly any influence on the championship results when compared with alternative ranking criteria. On the basis of this insight, for the following

¹ According to the 2-point rule, teams gain two plus points for a match win, a plus and a minus point for a draw and two minus points for a match defeat. In the 3-point system teams gain three points for a win and one point for a draw. In a league with the 2-point rule, the plus and minus points are reported in the final league table. Because of the constant total number of points the ranking is by definition identical when only the plus points are reported. The following calculations are based only on the plus points.

² The correlation between match win ratio and 2 point rule is 1, since here it is merely a question of a mathematical reformulation.

³ The Serie A in the 2000/01 season represents a serious exception. According to the 3 point rule SSC Naples finished in 17th place and was relegated as a result. If the 2 point rule had been in operation, the team would have reached 13th place (and would not have been relegated).

estimates the European football league results and the NHL results were converted into the winning percentage used in the other final league tables of the US-American Major Leagues.

In order to determine the competitive balance in the eight leagues examined, we can fundamentally use the measurement concepts familiar from the measurement of economic concentration:

- The range (*RANGE*), which states the difference between the largest and smallest observed values is suitable because the ranking criterion used (the winning percentage) is identical for all leagues and is also limited to the range [0;1]. In particular it appears suited to registering any lack of incentive emanating from the fact that no risk of relegation exists in the US-American Major Leagues.
- The interquartile range (*QRANGE*) measures the difference in performance between the top and bottom quartiles and hence between the – from a sports perspective – particularly important championship or super competition qualification places and the relegation places.
- The standard deviation (*STDEV*) has an advantage over the range and the interquartile range by virtue of the fact that all the observed values are included in the calculation. In the present study the comparability of these indicator values is given due to the constancy of the mean of the individual observed time series as well as between the leagues.
- The ratio of competitive balance (*RSD*) represents a normalized standard deviation which normalises the actual standard deviation of the winning percentage using an idealised standard deviation. This index has been introduced by NOLL (1988), SCULLY (1989), and QUIRK & FORT (1992). In this context a league is regarded as absolutely balanced (ideal) when all teams have equally playing strengths and hence have a winning percentage of 0.500. With n matches in a season this results in an idealised standard deviation of $0.500/\sqrt{n}$. The *RSD* assumes the value of one when the actual and the ideal-

ised standard deviation are identical. The larger this index is, the greater will be the according imbalance and the lower the competitive balance.

- The Herfindahl-Hirschman Index (*HHI*) has a value range of $[1/n;1]$. Given that the statistical units are weighted with themselves, the Herfindahl-Hirschman Index is largely determined by the few biggest statistical units. Its use can be recommended when for competition theory considerations particular importance is attached to the largest participants in individual markets (HÄNI, 1987, p. 85), which is regularly the case in professional team sports leagues. During interpretation it should be noted that the values effectively ascertained are relatively low in the value range, even for large concentrations. This can tend to lead to an intuitive underestimation of the concentration relations of a market.
- The Horvath Index (*HOR*) combines elements of the discrete and cumulative concentration measures, by including both the concentration rate CR_1 as well as a Herfindahl Index (with an additional weighting component). It has a value range of $[0;1]$. Its advantage lies in the fact that the largest statistical unit is included completely in the index. This in turn means that the Horvath Index displays no tendency towards underestimation.

Various other indicators are also used in the relevant economics and sports economics literature, which will not be taken into consideration here for a number of reasons. As, given a constant mean, the correlation between the standard deviation and the variation coefficient is one, we can dispense with the latter measure. We do not use the Gini coefficient⁴ likewise, because the skewness of the frequency distribution, which cannot be rendered by the Gini coefficients (N.N., 1994, p. 828), can be of significance for the evaluation of concentration in the context of sports leagues.

⁴ See also UTT & FORT (2002).

The calculation of competitiveness with the aid of the above-mentioned measurement concepts took place on the basis of the final league tables of the four large European football leagues (ITA, ENG, GER, ESP) as well as the four large US-American Major Leagues (NBA, NFL, NHL, MLB). The observation period covered the seasons 1969/70 to 2003/04. Table 2 contains the average indicator values for all leagues, whereby it should be noted that low indicator values represent a high balance of competition.

Tab. 2 Average Indicators of Medium-term Competitive Balance, 1969/70 to 2003/2004

Country	STDEV	SW	QS	RSD	H	HOR
ITA	0.129	0.492	0.163	1.459	0.063	0.196
ENG	0.112	0.445	0.144	1.431	0.050	0.157
ESP	0.110	0.434	0.128	1.315	0.056	0.174
GER	0.117	0.442	0.147	1.362	0.058	0.182
NBA	0.147	0.546	0.213	2.645	0.047	0.149
NFL	0.192	0.729	0.282	1.495	0.041	0.132
NHL	0.116	0.444	0.161	2.065	0.051	0.157
MLB	0.069	0.272	0.096	1.734	0.039	0.119
Ø Europe	0.117	0.453	0.146	1.392	0.057	0.177
Ø USA	0.131	0.498	0.188	1.985	0.044	0.139

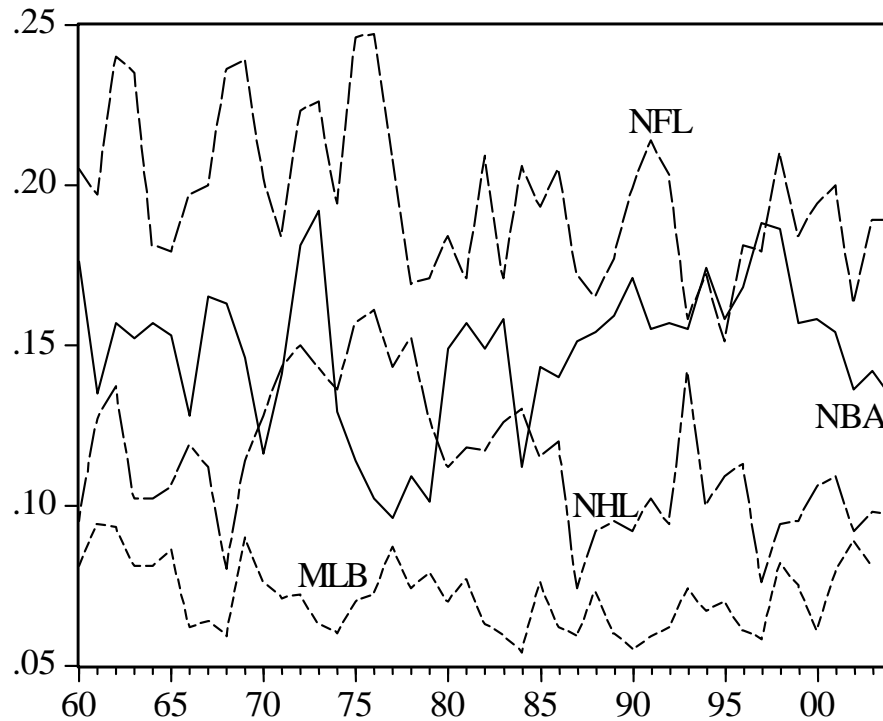
Source: Own calculations.

The first thing that one notices here is that the MLB demonstrates the lowest values for all indicators with the exception of the index *RSD*, and hence on an average of the 35 seasons considered here can be regarded as by far the most balanced league. Among the European football leagues the Italian Serie A is the most imbalanced league. Furthermore, using the standard deviation (*STDEV*), the range (*RANGE*), the interquartile range (*QRANGE*) and the index *RSD* we see that, on average, competition in the European football leagues is more intense than in US leagues. This is evident particularly as a result of the fact that both the NBA and the NFL are considerably more imbalanced than the European football leagues. If we use the Horvath Index (*HOR*) and the Herfindahl-Hirschman Index (*HHI*) the picture changes somewhat. From this perspective the US leagues now show, over an average of the four leagues, higher balance of competition than the European leagues, with the MLB once again demonstrating the highest balance of competition.

The described differences could be attributed to the special characteristics of the indicators which were employed. The measures of dispersion (*STDEV*, *RANGE* and *QRANGE*) relate specifically the differences in winning percentages between the first and the last teams. Therefore, it does not come as a surprise that the US-American Major Leagues show lower average values for these indicators: There is no threat of being relegated. The higher average values of European soccer leagues for the Hirfindahl-Hirschman-Index and the Horvath-Index can be explained by the fact that these indicators are largely determined by the few biggest statistical units. In addition it should also be noted that *HOR* and *HHI* indicate that the English Premier League manifests a significantly higher competitive balance than the other European football leagues.

Of possibly greater interest than the somewhat anecdotal relevance of such a consideration of averages is the plot of the indicator time series. Figure 1 shows an exemplary representation of the standard deviation of the winning percentage, here initially for the US leagues.

Fig.1 Standard Deviation of the US-American Major Leagues, 1969/70 to 2003/04

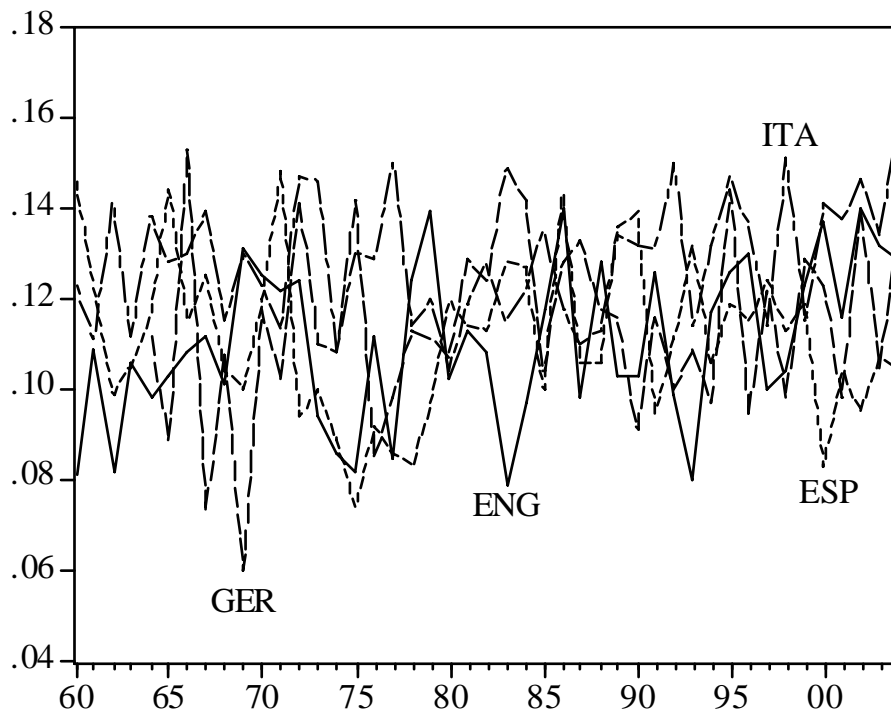


Source: Own illustration.

The MLB's average lower indicator values (or higher competitive balance) shown above are seen to be robust throughout the entire observation period. The NFL's high indicator value as reported in Table 2 is also clearly in evidence here. The NFL demonstrates the lowest competitive balance over the entire period (with the exception of the years 1994, 1995 and 1997, where the value for the NBA was higher).

It is not possible to draw such clear conclusions from Figure 2, which shows the standard deviations of the winning percentage of the European football leagues.

Fig. 2 Standard Deviations of the European Soccer Leagues, 1969/70 to 2003/04



Source: Own illustration.

This visual representation can hardly serve to confirm a secular trend towards reduced balance of competition as repeatedly assumed by associations and competition organisers – particularly in Europe – and which is often a cause for demands for greater sports policy intervention.

3 Trends in Competitive Balance

For an empirical test for trends in competitive balance, OLS regressions with a constant were carried out (SCHLITGEN & STREITBERG, 1991, p. 13). The significance of the individual trends was determined on the basis of the usual critical values for the t-statistics. To do justice to any developments in the recent past the calculations were performed both for the entire observation period 1969/70 – 2003/04 (Table 3) as well as for the sub-periods 1979/80 – 2003/04 (Table 4) and 1989/90 – 2003/04 (Table 5). As only the trend is of interest here, we refrain from reporting the constant.

Tab. 3 Trends (Sample: 1969/70 to 2003/04)

<i>League</i>	<i>STDEV</i>	<i>RANGE</i>	<i>QRANGE</i>	<i>RSD</i>	<i>HHI</i>	<i>HOR</i>
ITA	0.0005 ^{**}	0.0034 ^{***}	-0.0002	0.0095 ^{**}	-0.0003 ^{***}	-0.0008 ^{***}
ENG	0.0005 [*]	0.0022 [*]	0.0003	0.0043	0.0002 ^{***}	0.0007 ^{***}
GER	3.47e ⁻⁰⁵	-0.0001	0.0007	0.0006	8.40e ⁻⁰⁷	-3.98e ⁻⁰⁵
ESP	0.0002	0.0008	0.0004	0.0064 [*]	-0.0003 ^{***}	-0.0009 ^{***}
NBA	0.0009 ^{**}	0.0028 [*]	0.0024 ^{***}	0.0142 [*]	-0.0009 ^{***}	-0.0025 ^{***}
NFL	-0.0008 ^{**}	-0.0029 [*]	-0.0022 [*]	-0.0029	-0.0003 ^{***}	-0.0008 ^{***}
NHL	-0.0017 ^{***}	-0.0038 ^{***}	-0.0028 ^{***}	-0.0292 ^{***}	-0.0012 ^{***}	-0.0037 ^{***}
MLB	0.0001	0.0002	0.0004	0.0011	-0.0003 ^{***}	-0.0008 ^{***}

Source: Own calculations; ^{***} p<0.01, ^{**} p<0.05, ^{*} p<0.10.

Tab. 4 Trends (Sample: 1979/80 to 2003/04)

<i>League</i>	<i>STDEV</i>	<i>RANGE</i>	<i>QRANGE</i>	<i>RSDI</i>	<i>HHI</i>	<i>HOR</i>
ITA	0.0012 ^{**}	0.0051 ^{***}	0.0015	0.0186 ^{***}	-0.0003 ^{***}	-0.0008 [*]
ENG	0.0011 ^{**}	0.0033	0.0004	0.0098 [*]	0.0003 ^{***}	0.0010 [*]
GER	-0.0003	-0.0004	-0.0003	-0.0036	-1.54e ⁻⁰⁶	-0.0001
ESP	-0.0008 [*]	-0.0025	-0.0003	-0.0051	-0.0004 ^{***}	-0.0012 [*]
NBA	0.0004	0.0002	0.0015	0.0031	-0.0006 ^{***}	-0.0017 [*]
NFL	-0.0001	-0.0034	0.0005	0.0024	-0.0002 ^{***}	-0.0008 [*]
NHL	-0.0008 [*]	-0.0016	-0.0010	-0.0151 [*]	-0.0008 ^{***}	-0.0027 [*]
MLB	0.0006 ^{**}	0.0025 [*]	0.0015 ^{**}	0.0162 ^{**}	-0.0003 ^{***}	-0.0008 [*]

Source: Own calculations; ^{***} p<0.01, ^{**} p<0.05, ^{*} p<0.10.

Tab. 5 Trends (Sample: 1989/90 to 2003/04)

<i>League</i>	<i>STDEV</i>	<i>RANGE</i>	<i>QRANGE</i>	<i>RSD</i>	<i>HHI</i>	<i>HOR</i>
ITA	0.0010	0.0044	0.0018	0.0112	0.0001	0.0002
ENG	0.0021 ^{**}	0.0057	0.0024	0.0227 [*]	0.0003 ^{**}	0.0012 ^{**}
GER	0.0017	0.0047	0.0020	0.0184	0.0002 [*]	0.0008 [*]
ESP	-0.0015 [*]	-0.0067	-0.0010	-0.0191 [*]	-0.0001	-0.0004
NBA	-0.0017 [*]	-0.0056	-0.0052 [*]	-0.0357 [*]	-0.0004 ^{***}	-0.0011 ^{***}
NFL	-0.0003	-0.0058	-0.0004	-0.0027	-0.0004 ^{***}	-0.0013 ^{***}
NHL	-0.0006	-0.0067	0.0039 ^{**}	-0.0067	-0.0011 ^{***}	-0.0035 ^{***}
MLB	0.0018 ^{***}	0.0059 [*]	0.0042 ^{**}	0.0489 ^{***}	-0.0005 ^{***}	-0.0013 ^{***}

Source: Own calculations; ^{***} p<0.01, ^{**} p<0.05, ^{*} p<0.10.

In the overall period from 1969/70 – 2003/04, twelve of the 48 trends determined are significantly positive (five of them however only on the 10% level), with 19 significantly negative (only two on the 10% level) and the remaining 17 insignificantly different from zero. The positive trends are spread among the NBA (4), the English Premier League (4), the Italian Serie A (3), and the Spanish Primera

División (1). It should also be noted that no significant trend could be detected for the German Bundesliga, which thus occupies a unique position. Moreover, it is noticeable that almost half of the significant trends (14 out of 32) occur on the basis of the two concentration measures, i.e. the Herfindahl-Hirschman Index and the Horvath Index. On the basis of these two measures, six leagues are subject to a significantly negative trend, whilst only the English Premier League is subject to significantly positive trends. For the period as a whole it is evident that in the case of significant trends these generally display identical tendencies for the individual leagues in question. Only the NBA displays positive trends for the dispersion measures standard deviation (*STDEV*), range (*RANGE*), interquartile range (*QRANGE*) and the index *RSD*, whilst negative trends can be perceived with the concentration measures Herfindahl-Hirschman Index (*HHI*) and Horvath Index (*HOR*). The situation is similar for the Italian Serie A. Hence in the period as a whole only a few leagues manifested a weak confirmation of the assertion of reduced competitiveness. On the contrary, the empirical evidence points rather towards a tendential increase in the competitive balance in the professional leagues examined.

The tendential statements also do not change when shortened observation periods are used. The number of significantly positive trends in the two sub-samples remains more or less constant at eleven each. However in all samples the significantly negative and insignificant trends predominate. As far as the individual leagues are concerned, the sub-samples initially confirm the observation on the German Bundesliga. Only for the sample 1989/90 to 2003/04 are two significantly positive trends for the concentration measure in evidence, whereby it should be noted that these are merely significant at the 10% level. To this extent the Bundesliga's exceptional position is also confirmed in the sub-samples. The English Premier League displays only significantly positive or insignificant trends in all the sub-samples. By contrast, the clearest example of a trend towards a higher level of competitive balance is the NHL, all of whose trends are negative (with one exception). In this context it should also be noted that all the NHL's negative trends in the overall period are significant at the 1% level. Finally we would like to point out that examples can be found for leagues where the indica-

tors within a single period allow both significantly negative and significantly positive trend interpretations (e.g. the NBA both in the overall period as well as in the sub-sample 1969/70 – 2003/04, the ITA in the sub-samples 1969/70 – 2003/04 and 1979/80 – 2003/04).

Overall we can conclude that the popular hypothesis of a growing imbalance in the professional team sports leagues has no real justification in this generalised form. Only for the English Premier League was it consistently not possible to contradict this assertion, particularly in the light of the Herfindahl-Hirschman Index and the Horvath Index, both over the observation period as a whole as well as over the sub-periods.

4 Conclusion

A central aspect in the literature of sports economics is the uncertainty of outcome hypothesis. Many studies have treated the concept of competitive balance, either theoretically (KESENNE, 2000; SZYMANSKI & KESENNE, 2004; VROOMAN, 1995) or empirically (GERRARD, 2004; MICHIE & OUGHTON, 2004; QUIRK & FORT, 1992; SCHMIDT & BERRI, 2001). The aim of this article was to illustrate trends in competitive balance. For the entire observation period, of 48 trends ascertained, only 12 could be observed as being significantly positive with 19 significantly negative. The remaining 17 trends were insignificantly different from zero. Since similar results also occur for the calculation of trends in the sub-samples, it may be said overall that the popular posited theory of growing imbalance in professional team sports leagues cannot be verified in this general form.

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