# *Quantification of competitive balance in European football; development of specially designed indices*

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*The most common indices of competitive balance have not been derived within the context of European football leagues. Domestic championships are multi-prize tournaments as opposed to common North American ones with a single prize. In addition to the competition for the championship, the best teams also compete to qualify for the lucrative European tournaments whereas the worst teams struggle to avoid relegation. This article introduces specially designed indices for measuring the level of competition for winning any of the important prizes awarded in the league as well as the development of the Special Concentration Ratio ( $SCR_K^I$ ) measuring the overall level of competitive balance by accounting the level of uncertainty for all prizes. This approach not only leads to a new perspective for the overall level competitive balance but also enables to determine its ingredient sources.*

**Keywords**: competitive balance; concentration ratio; European football; English Premiership.

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## 1. Introduction

Football is one of the most popular professional team sports in the world and a very profitable business, as professional leagues (especially in Europe) show considerable growth in annual turnover figures. Despite its substantial growth, there are important issues that the industry has to address in order to ensure its long-term success. One of the key issues is competitive balance which reflects the uncertainty of outcome in sporting events (Michie & Oughton, 2004). The excitement generated by the uncertainty of the event outcome instigates fans' interest and thus leads to a greater demand for attending and viewing sport events, other things being equal (Rottenberg, 1956).

Due to its prominent importance for professional team sports, the measurement of competitive balance has become main topic of discussion and study amongst researchers in sport economics. Therefore, a great diversity of different approaches has been introduced in the literature towards a better quantification of competitive balance. As Zimbalist (2002) notices, "there are almost as many ways to measure competitive balance as there to quantify money supply". Although there is a proliferation of indices, they all suffer from a number of shortcomings when applied to European football. Existing indices have not been derived in the context of the complex structure of European football leagues where domestic championships are multi-prize tournaments as opposed to common North American ones with a single prize (Kringstad & Gerrard, 2007). More specifically, in addition to the competition for the championship, the best teams also compete to qualify for the lucrative European tournament (e.g. Champions League, Europa League) whereas the worst teams struggle to avoid relegation. Therefore, the overall level of competitive balance is determined by the corresponding levels of uncertainty involved in the conquest of those league objectives. Conceptually, from fans perspective, it is required a new approach for the development of specially designed indices to measure this multi-level competitiveness.

This paper focuses on the seasonal dimension which deals with the relative qualities of teams into a particular season though a similar methodology can be easily implemented for the between-seasons dimension. Section 2 outlines the three levels of competiveness and briefly discusses existing indices and the implications associated with their application in European football. In Section 3, a set of specially designed indices is introduced followed by the application in English Premiership in Section 4. Lastly, Section 5 concludes with a summary of the main points.

## 2. Championship structure in European football and existing indices of competitive balance

European football leagues present a complex tournament structure offering multiples prizes for competing teams. Essentially, domestic European championships can be regarded as three-stage tournaments in which teams compete for the corresponding ordering sets of prizes or punishment as follows:

a) First stage or first prize is the championship title which is considered the most prestigious prize in any league. Provided that any team seek for this title regardless of any other aspiration, it is reasonable to assume that the first place in the final ranking is the most desirable for any team.
b) Second stage or second set of prizes are the qualifying places for participation in European tournaments the following season. Currently, there are two very strong such tournaments; the lucrative Champions League and the newly formatted Europa League. Those tournaments, especially the Champions League, they offer reputation and, most importantly, high monetary prizes and bonuses for both participation and successful results. Therefore, over and above the championship title, teams also compete for any of the remaining pre-determined top places.
c) Third stage or set of punishment are the relegation places. Given that European leagues are open, teams that show poor performance and finish in the last league positions are relegated to the lower division. Such a demotion has severe repercussions in both the financial status and the athletic prestige of the relegated team; hence, it is regarded as a punishment. Consequently, in contrast to the desirable first and second stages, teams strive to avoid relegation by aiming to take over positions safely higher than the ones leading to it.

The adoption of this three-stage tournament structure by European leagues has been partly motivated by the longing to maximize fans' demand for attending or watching as many important games as possible. However, there is evidence that domestic leagues are dominated by a small number of teams at an escalating rate (Goossens, 2006, Michie & Oughton, 2004). In a complex tournament structure, domination in the first stage or prize may be less worrying if there are satisfactory levels of competition for the other two stages or sets of prizes. For instance, championship domination by a particular team (first stage) may be compensated by sufficient levels of competition for both qualification in European tournaments and avoidance of relegation in a lower division. Intuitively, in a complex tournament structure, the level of competitive balance is determined by the corresponding levels in the three aforementioned stages. Evidently, these indices have to account for the relative importance of stages from fans perspective. Rationally assumed, the competition for the championship title is more important than this for relegation. Additionally, a higher ranking place is advantageous when participating in European tournaments; and thus, the top qualifying places in the second stage are rated accordingly. Hence, stages and ranking positions have to be weighted according to their significance when measuring the overall competitive balance.

There are several indices of competitive balance which have been applied to professional team sports; however, it is argued they have not been developed in the context of complex structure in European football. In particular, they refer to the most common North American unitary structure with a single prize which is the first stage. The most widely used is the *Ratio of Standard Deviation* (*RSD*) introduced by Noll (1988) and Scully (1989) who assume that a natural way to measure competitive balance is to divide the observed standard deviation of winning percentages (*STD*) by the ideal standard deviation. Goossens (2006) proposes an alternative ratio to account for the variability in league size, the so called *National Measure of Seasonal Imbalance* (*NAMSI*). In effect, she compares the *STD* not with the ideal situation but rather with the most undesirable; that is, the standard deviation in case of a totally unbalanced league.

As competitive balance is essentially concerned with inequalities amongst teams, borrowing indices from the area of industrial organization is not surprising. For instance, Owen *et al.* (2007) introduced a normalized variation of the *Herfindahl-Hirschman Index* (*HHI**) and Utt and Fort (2002) adjusted the traditional index of inequity *Gini Coefficient* (*Gini*) for sports. In the effort for an enhanced quantification of competitive balance a diversity of innovative approaches have been also adopted. For instance, Groot and Groot (2003) assume that fans become excited when a lower ranking team wins against a top team; and thus, they have developed the *Surprise Index* (*S*) which is based on the calculation of surprising points. Additionally, Haan *et al.* (2002) present the standard deviation of teams qualities estimated via a simple econometrical model as a competitive balance index. Essentially, most of the existing indices employ the distribution of teams using various units of measurement. However, this distribution does not account for the complex structure in European football and its importance for fans; and thus, it is required the design of special indices for an enhanced assessment of competitive balance. In our perception, this is what Kringstad and Gerrard (2007) call it as "the need to move beyond competitive balance". It is implied that a new conceptual approach has to be adopted for the development of alternative indices. Such an approach must take into consideration the level of competition in each stage and rate them accordingly.

### 3. Development of specially designed indices

Following the discussion of the previous section, the objective of this work is to provide a more systematic approach for the quantification of competitive balance specifically applied in the complex European football leagues. Conceptually, the design of special indices is inspired by the necessity to quantify the level of competition in each stage and weight ranking positions according to their significance. For the development of those indices, the *Normalized Concentration Ratio* ($NCR_K$) is employed. The $NCR_K$ is the normalization of the widely used $CR_K$ index (Koning, 2000) and essentially describes how much stronger are the top $K$ teams relative to the rest and is given by:

$$NCR_K = \frac{\sum_{i=1}^{K} P_i - 2K(N-1)}{2K(N-K)} = \frac{1}{2(N-K)}\left(\frac{1}{K}\sum_{i=1}^{K} P_i\right) - \frac{N-1}{N-K}. \quad (1)$$

Intuitively, this index can be adjusted to capture any of the aforementioned stages or sets of prizes. Obviously, $NCR_1$ effectively captures the level of competition for the first stage and it can be interpreted as the domination degree of the champion. Following the calculation of the $NCR_K$ (the version considering the older 2-1-0 point system), the *Normalized Concentration Ratio for the Champion* ($NCR_1$) is given by:

$$NCR_1 = \frac{1}{2(N-1)} P_1 - 1, \tag{2}$$

where $P_1$ and $N$ stand for the number of points collected by the champion and the number of teams in the league respectively. The range of the index is from zero to unity. The former stands for absence of domination in which the champion collects 50% of the maximum attainable points whereas the latter stands for a complete domination in which the champion collects the maximum attainable number of points.

With respect to the second stage, the performance of teams (from the second to *K*th ranking position) clearly depends on the champion's relative performance; and thus, the design of an index only for the second stage is a rather complicated issue. To overcome this, it is attempted a joint calculation of the first and second stage in a single index. Therefore, it is introduced the *Adjusted Concentration Ratio* ($ACR_K$) which captures both stages. The development of the $ACR_K$ is grounded on the assumption that the higher the ranking place the more interesting becomes for fans; and thus, ranking places must be rated accordingly. To clarify, consider a league of ten teams in which only the first two participate in European tournaments. Apparently, those that qualify are the champion (first place) and the second runner team (second place). The competition for the championship correspond to the first stage whereas this for the second place stands for the second stage. Although the $NCR_1$ effectively captures the competition for the first stage, the $NCR_2$ alone cannot capture each of the stages. The reason is that $NCR_2$ equally rates the two stages; and thus, it is required an index to account for the relative significance of each stage. Evidently, the champion is more important than the second team although both participate in European tournaments and this should be taken into consideration when measuring competitive balance. By intuition, the relative significance of the two stages (or positions) is effectively captured by employing the average of the $NCR_1$ and $NCR_2$ indices. Essentially, the resultant average index captures the level of competition between the two stages as it is illustrated in the hypothetical scenario presented in Table 1.

TABLE 1. Average of the $NCR_1$ and $NCR_2$

| *Team Ranking* | *League A:* | *League B:* |
|---|---|---|
| *1* | 36 | 30 |
| *2* | 24 | 30 |
| *3* | 20 | 20 |
| *4* | 18 | 18 |
| *5* | 16 | 16 |
| *6* | 16 | 16 |
| *7* | 14 | 14 |
| *8* | 14 | 14 |
| *9* | 12 | 12 |
| *10* | 10 | 10 |
| ***$NCR_1$*** | *1* | *0.667* |
| ***$NCR_2$*** | *0.75* | *0.75* |
| **Average (*$NCR_1$, $NCR_2$*)** | *0.875* | *0.708* |

After the third place, Leagues *A* and *B* display identical results though there is a markedly point difference between the champion and the second team. The $NCR_1$ and $NCR_2$ indices effectively demonstrate the level of domination by the champion and by the top two teams respectively. However, $NCR_2$ does not account for the relative importance of those teams. Alternatively $NCR_2$ fails to capture the level of competition between the top two teams. Apparently, *League B* is more balanced than *League A* though this cannot be drawn from the $NCR_2$. Consequently, the average of the two indices provides an enhanced estimation of competitive balance. This procedure can be generalized for any number in the top *K* positions

as long as their value is unequally rated. Thus, it is derived the $ACR_K$ which adjusts for the relative significance of the top $K$ positions and effectively captures both first and second stage. Following the calculation of the $NCR_K$ in equation (1), the $ACR_K$ is given by:

$$ACR_K = \frac{\sum_{i=1}^{K} NCR_i}{K} = \frac{1}{K}\left[\sum_{i=1}^{K} w_i P_i - C_K\right], \tag{3}$$

where $w_i$ stands for the weight attached to the $i$th team, and $C_K$ is a constant term given by:

$$C_K = \sum_{i=1}^{K} \frac{N-1}{N-i}. \tag{4}$$

The $ACR_K$ ranges from zero to unity. The former stands for absence of domination in which any of the top $K$ teams collects 50% of the maximum attainable points. In such a case, the league is in perfect balance state since all teams equally share points. As far as the latter concerns, it stands for both complete domination by the $K$ teams and complete imbalance among the $K$ teams. In particular, the upper bound is obtained when: a) the top $K$ teams collectively gather the maximum attainable number of points, and b) within the group of $K$ any team always wins against any weaker and loses from any stronger. Given that $ACR_K$ possesses two different qualities, it is interpreted as the level of domination by the top $K$ teams and the level of competition among the $K$ teams. Interestingly enough, the subtraction of the $NCR_K$ from the $ACR_K$, following equations (1) and (3), effectively compares those two qualities:

$$ACR_K - NCR_K = \frac{\sum_{i=1}^{K-1} NCR_i - (K-1)NCR_K}{K}. \tag{5}$$

If subtraction in equation (5) is zero, the level of domination by the top $K$ teams equals the level of competition among the top $K$ teams. If subtraction is positive or negative, then the level of domination by the top $K$ teams or the level of competition among the top $K$ teams mostly contribute for a more balanced league. A limitation of $ACR_K$ is that it does not offer any information for the level of competition of teams after the $K$th position. However, such a limitation was expectable from of the index's design. The $ACR_K$ is distinguished from the other indices because of two unique features worth of closer examination:

a) There are employed $K$ simpler indices for the calculation of the index. Consequently, the $ACR_K$ can be decomposed into its various components; and thus, to determine the ingredient sources of the overall competitive balance. For instance, depending upon the specific interest of the league, important remarks can be drawn from the level of competition in any component index.
b) The $ACR_K$ rates the two stages and the top $K$ ranking positions according to their significance from fans perspective. Actually, the $w_i$ attached to the $i$th team, it is derived from the partial sum of the harmonic series with first term $1/2(N\text{-}1)$ and last term $1/[2K(N\text{-}K)]$. Therefore any weight $w_i$ is given by:

$$w_i = \sum_{j=i}^{K} \frac{1}{2j(N-j)}, \text{ for } i<K<N/2. \tag{6}$$

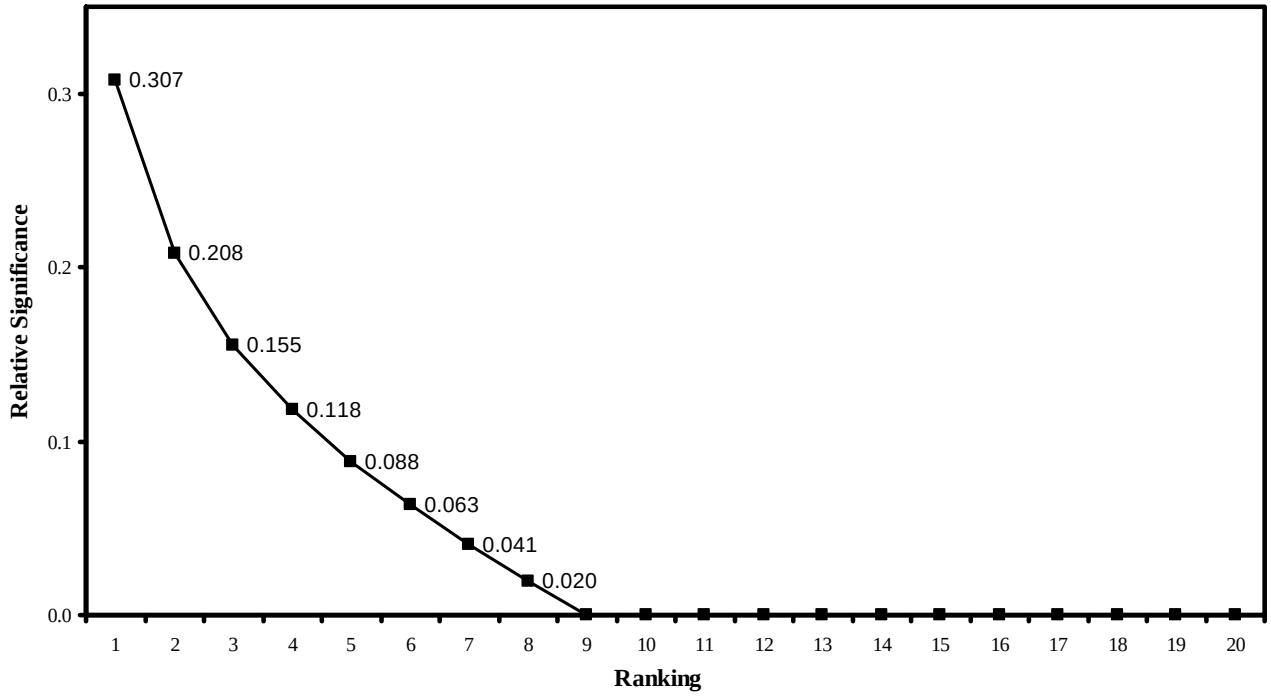
Then, $w_i$ forms a sequence of the partial sums defined as follows:

$$\begin{aligned}
w_1 &= \frac{1}{2(N-1)} + \frac{1}{4(N-2)} + \frac{1}{6(N-3)} + \ldots + \frac{1}{2K(N-K)} \\
w_2 &= \frac{1}{4(N-2)} + \frac{1}{6(N-3)} + \ldots + \frac{1}{2K(N-K)} \\
w_3 &= \frac{1}{6(N-3)} + \ldots + \frac{1}{2K(N-K)} \\
&\cdots \\
w_K &= \frac{1}{2K(N-K)}.
\end{aligned} \tag{7}$$

It can be noted that the first weight $w_1$ includes all the terms, the second all but the first term and so down to the last weight $w_K$ with only the last term of the sum given in equation (6). The value of $w_i$ is controlled by

the design of the index for an enhanced estimation of fans' interest since it is increasing and decreasing function of $K$ and $N$ respectively. More importantly, it can be derived from sequence (7) that $w_i$ is decreasing function of the ranking position denoted here by index $i$. This is reasonable since the higher the ranking position (i.e. the lower $i$) the greater the interest from fans perspective. Furthermore, for a given $K$, the rate of this decrease in $w_i$ is an increasing function of $N$ which is also acceptable. For instance, it is rational for the champion to be rated higher in a 20 teams than in a 10 teams league. To better illustrate the $w_i$, let's consider a 20 teams league in which the top eight qualify to European tournaments. Based on this specific league structure, the appropriate concentration index for the level of competitive balance is the $ACR_K$ for $K$=8 which rates the top eight positions as it is presented in Fig. 1.

FIG. 1: Relative significances in $ARC_K$ for $K$=8




As it is depicted on this figure, there is no weight attached for teams after the eighth position since they are not included in the calculation of the index. Additionally, it is confirmed the increasing rate of the weight's increase from the eighth to the first position. This is desirable since fans' interest progressively increases and it is culminated for the championship winner.

Considering that promotion-relegation rule is a significant aspect of the European football structure, the respective level of competition cannot be ignored, and thus, the *Normalized Concentration Ratio for Relegated Teams* ($NCR^I$) is introduced to measure the degree of weakness of the $I$ relegated teams as compared to the rest. For the proper development of the $NCR^I$, its boundaries have to be well documented. For this reason, it is initially calculated the number of points the $I$ teams can gather in both a perfectly balanced and a completely unbalanced for relegation league. The former is obtained when the $I$ teams collect the maximum number of points ($I_{PB}$) and it stands for a perfectly balanced, in terms of relegation, league. The latter is reached when the $I$ teams gather the minimum number of points ($I_{UB}$) and it stands for a completely unbalanced, in terms of relegation, league. More specifically, the $I_{PB}$ is reached when the $I$ teams collectively gather the average number of allocated points in the league which are equal to $2I(N\text{-}1)$. On the other hand, the $I_{UB}$ is reached when the $I$ teams gather points only from the games played between them. That is, any $I$ team always loses from any team above the $(N\text{-}I)$th position. Since the total number of games among the last $I$ teams is $I(I\text{-}1)$, $I_{UB}$ equals $2I(I\text{-}1)$. Given that $I_{PB}$ and $I_{UB}$ are a function of $N$ and/or $I$, for the proper design of the $NCR^I$, two conditions have to be met:

a) It is required a relative measurement of the observed value. This can be accomplished by choosing as a point of reference either the $I_{PB}$ or the $I_{UB}$. For comparability issues, it is chosen as a benchmark the $I_{PB}$.

Consequently, the subtraction of the observed value from the $I_{PB}$ provides a re-located to zero measurement. It is noted that, it could also be chosen the $I_{UB}$ as a point of reference. In that case, $I_{UB}$ is subtracted from the observed value and thus $NCR^I$ index ranges from unity to zero.

b) The index must be relatively robust to the size of the league $N$ and the number of relegated teams $I$. Consequently, the relative observed value has to be controlled for its feasible range ($I_{PB}$ - $I_{UB}$).

Therefore, the ratio of the above two conditions provides the formula of $NCR^I$ as:

$$NCR^I = \frac{I_{PB} - \sum_{i=N-I+1}^{N} P_i}{I_{PB} - I_{UB}} = \frac{2I(N-1) - \sum_{i=N-I+1}^{N} P_i}{2I(N-1) - 2I(I-1)} = \frac{N-1}{N-I} - \frac{1}{2(N-I)}\left(\frac{1}{I}\sum_{i=N-I+1}^{N} P_i\right), \text{ for } I<N/2. \quad (8)$$

The value of $NCR^I$ ranges from zero to unity. The index reaches its lower bound if the $I$ teams are strong enough to collect the maximum attainable number of points. In such a case, the league is in perfectly balanced state since all teams equally share the total number of points, and thus; there is absence of weakness of the $I$ teams. As $NCR^I$ increases, the $I$ teams become relatively weaker. As $NCR^I$ approaches its upper value (unity), the $I$ teams become very weak in relation to the rest. In such a case, there is obviously maximum weakness of the $I$ teams and they gather points only from the between games. Alternatively, there is absence of competition for relegation. The $NCR^I$ does not provide any information for the behaviour of the remaining ($N$-$I$) teams as well as for the level of competition among the $I$ teams. The former is a limitation explained by the design of the index whereas the latter is not considered as that important from fans' perspective.

Lastly, it is introduced the *Special Concentration Ratio* ($SCR_K^I$) which captures all three stages in a complex tournament structure. The $SCR_K^I$ rates stages and ranking positions according to their significance from fans perspective and can be considered as a custom-built index easily adapted according to the specific interest in any league. For the development of the $SCR_K^I$ are employed the $ACR_K$ and $NCR^I$ indices which capture the first two and third stage respectively. The calculation of $SCR_K^I$ the is rather simple since component indices have similar features and capture different aspects of competitive balance. Essentially, the design of $SCR_K^I$ is based on the procedure followed for the $ACR_K$. This can be simply accomplished if the $NCR^I$ is considered to be a component index of the $ACR_K$. Therefore, following equations (3) and (8), $SCR_K^I$ is given by:

$$SCR_K^I = \frac{\sum_{i=1}^{K} NCR_i + NCR^I}{K+1} = \frac{1}{K+1}\left[\sum_{i=1}^{K} w_i P_i - \sum_{i=N-I+1}^{N} w_I P_i - C_K + C_I\right], \text{ for } I<K<N/2, \quad (9)$$

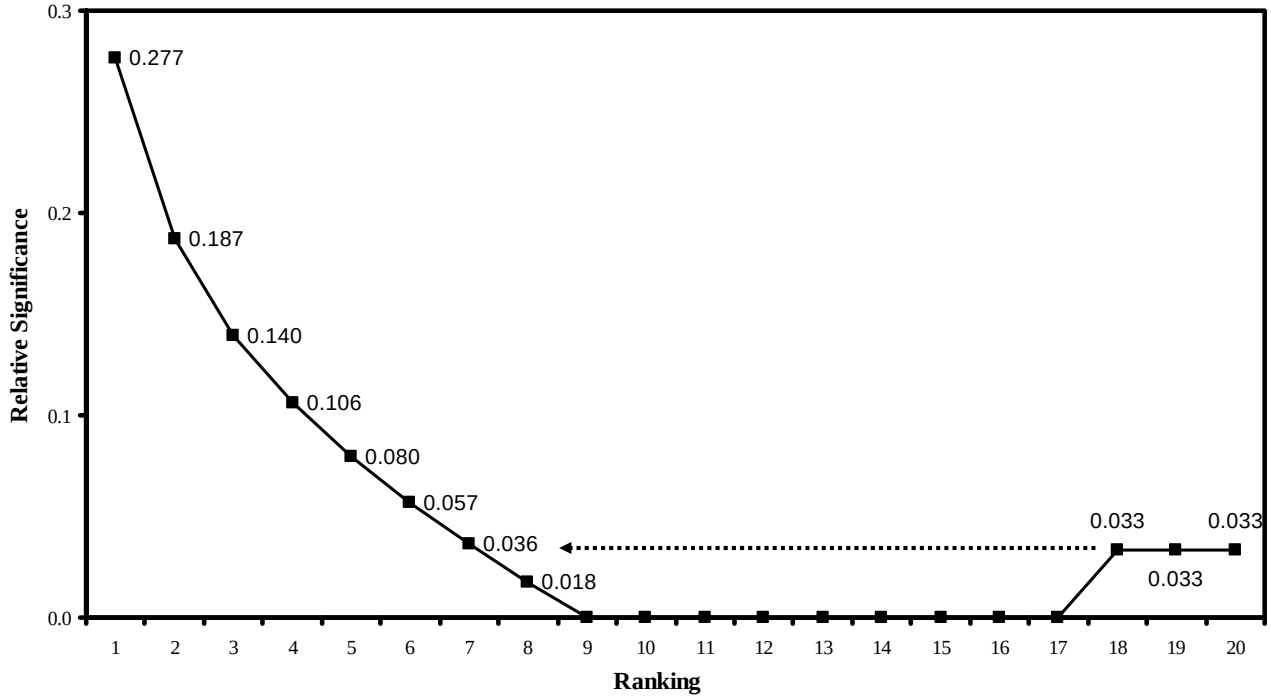
where $w_I$ stands for the weight attached to the relegated teams and $C_I$ is a constant term derived from $NCR^I$ and it is given by ($N$-1)/($N$-$I$). As it is expected, the interpretation of $SCR_K^I$ is not simple given that it holds three different qualities which are: a) the level of domination by the top $K$ teams, b) the level of competition among the $K$ teams, and c) the level of weakness of the last $I$ teams.

Similarly to the previous measures, $SCR_K^I$ ranges from zero to unity. The lower bound of the index is obtained in case that all teams equally share points and/or wins and stands for a perfectly balanced league defined by the minimum values in the three qualities. On the other hand, the upper bound of the index is obtained in case that: a) the top $K$ teams collectively gather the maximum attainable number of points, b) within the group of $K$ any team always wins against any weaker and loses from any stronger, and c) the $I$ teams collect points only from the between games.

The upper bound stands for a totally unbalanced leagued defined by the maximum values in any of the three aforementioned qualities. The $w_i$ attached to the top $K$ teams is identical with this in equation (3). On the other hand, the $w_I$ attached to the bottom $I$ teams equals 1/[2$I$($N$-$I$)] and it is the same for all $I$ relegated teams since it is assumed that the level of competition among the relegated teams is not intriguing for fans and teams themselves. As it is expected, $w_I$ is a decreasing function of both $N$ and $I$ (for $I<N/2$). The $w_I$ is higher than $w_K$ (weight for the $K$th team) for the realistic case of $I<K<N/2$. In particular, $w_I$ lies in between $w_K$ and $w_{K-1}$ which is questionable from fans perspective. However, this can be easily corrected by extending the number of qualifying teams ($K$) by one. It is noted that $w_I$ can be higher than $w_{K-1}$ only if $I<K/3$ which is not usual in European football. To demonstrate the variation in $w_i$ and $w_I$, consider a 20 teams league in which the top eight qualify to European tournaments and the last three are relegated to a lower division. In that

case, the appropriate concentration index for the estimation of the level of competitive balance is the $SCR_K^I$ for $K$=8 and $I$=3 which rates the top eight and bottom three positions as it is depicted in Fig. 2.

FIG. 2: Relative significances in $SCR_K^I$ for $K$=8 and $I$=3




It can be verified from the above figure that the highest relative significance is given to the first position which is the champion. For all the other top positions, the weight is decreasing in a diminishing rate. Additionally, any of the *I*th teams is rated higher than the *K*th team while there is no weight attached to the *N*-*K*-*I* teams in the middle of the ladder since they are not included in the calculation of the index. Basically, the $SCR_K^I$ is a composite index which employs $K$+1 simpler indices. However, it can be decomposed into its various components depending on the interest of examination without losing any information when studying competitive balance. The major advantage of $SCR_K^I$ is that it provides a reliable estimation for the level of competitive balance for various $N$, $K$, and $I$. Depending on which particular domestic league we are interested in, the $SCR_K^I$ can be adjusted accordingly. The variation in $N$ enables for an analysis of competitive balance across leagues and/or seasons. Additionally, the variation in $K$ and/or $I$ allows for an adjustment according to the league's specific structure.

## 4. Application in England

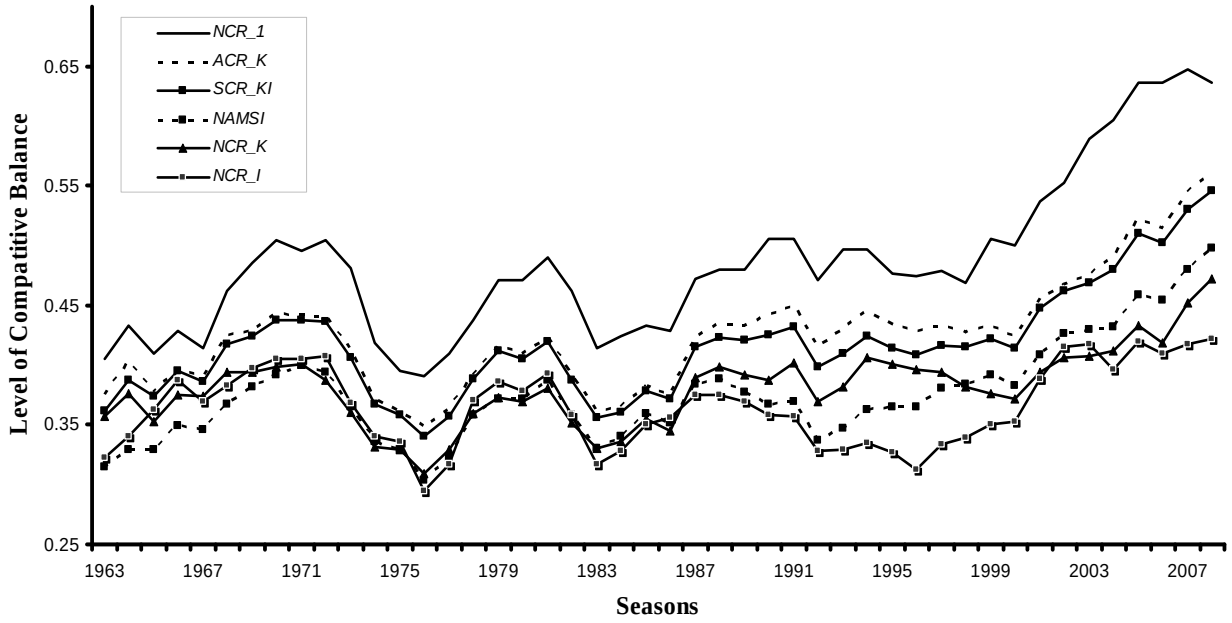
To demonstrate the main features of the new indices, it follows an application in Premiership for a period of 50 seasons (1959 till 2008). The usefulness of those indices is further illustrated by their comparison against the conventional *NAMSI* and $NCR_K$ indices. Table 2 depicts the evolution of the indices using the average for five seasons. The behaviour of the indices is further elucidated in Fig. 3 which demonstrates the moving average for five seasons MA(5) of all indices for the entire investigated period.

TABLE 2. Indices of competitive balance in Premiership, England

| *Index* | *59-63* | *64-68* | *69-73* | *74-78* | *79-83* | *84-88* | *89-93* | *94-98* | *99-03* | *04-08* |
|---|---|---|---|---|---|---|---|---|---|---|
| $SCR_K^I$ | 0.36 | 0.42 | 0.41 | 0.39 | 0.36 | 0.42 | 0.41 | 0.42 | 0.47 | 0.55 |
| *NAMSI* | 0.31 | 0.37 | 0.36 | 0.36 | 0.33 | 0.39 | 0.35 | 0.38 | 0.43 | 0.50 |
| $NCR_1$ | 0.40 | 0.46 | 0.48 | 0.44 | 0.41 | 0.48 | 0.50 | 0.47 | 0.59 | 0.64 |
| $ACR_K$ | 0.38 | 0.43 | 0.41 | 0.39 | 0.36 | 0.44 | 0.43 | 0.43 | 0.48 | 0.56 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $NCR_K$ | 0.36 | 0.39 | 0.36 | 0.36 | 0.33 | 0.40 | 0.38 | 0.38 | 0.41 | 0.47 |
| $NCR^I$ | 0.32 | 0.38 | 0.37 | 0.37 | 0.32 | 0.38 | 0.33 | 0.34 | 0.42 | 0.42 |

FIG. 3: MA(5) of all indices in Premiership (1959-2008)




It can be easily drawn that although competitive balance remains generally constant till the end of 90's, it remarkably declines afterwards. Those results slightly differ from the decline after season 1987 indicated by Michie and Oughton (2004). However, competitive balance further declines during the last 5 seasons when all indices display their highest values. It is noted that competitive balance worsens about 10% if we employ the composite $SCR_K^I$ instead of the conventional *NAMSI*. This is explained by the fact that $SCR_K^I$ weights ranking positions according to their significance whereas *NAMSI* equally weights teams on the top and the bottom of the ladder. Similarly, the $NCR_K$ overestimates competitive balance since it fails to capture the level of competition among the top $K$ teams. For the decline of competitive balance, it is generally adopted the explanation offered by Michie and Oughton for a growing gap between the top teams and the rest due to the increased revenue sources for successful results.

The ingredient sources of competitive balance can be further explored by investigating the behaviour of the component indices. In particular, from the comparison between the $NCR_1$ and $NCR^I$ indices it is derived that there are worrying levels of champions domination in contrast to the satisfactory levels of competition for relegation. The percentage difference between the two indices is continuously increasing and rises up to 50%. This is a strong indication that the champion is too strong for the rest teams to challenge his dominance. On the other hand, the promotion-relegation rule greatly contributes for a more competitive championship; and thus, proves to be a useful mechanism at least in England. Those two remarks partly explain the considerable decline of competitive balance during the last 5 seasons. Another interesting task is to compare the $ACR_K$ and $NCR_K$ indices which both focus on the top $K$ teams. The growing difference in favour of the $ACR_K$ mostly signifies lower levels of competition among the top $K$ teams rather than increasing levels of domination by the same teams. This can be confirmed by the relatively small difference between the $NCR_K$ and $NCR^I$ indices which is interpreted as comparable levels between domination by the top $K$ and weakness of the bottom $I$ teams. Explanations derived from the analysis of component indices can facilitate policy makers in their effort to protect the viability of European football leagues which is threatened by the worsening levels of competitive balance.

## 5. Conclusion

The complex structure in European football leagues generates challenges for an enhanced quantification of competitive balance. It is distinguished a three stage tournament structure which renders a new conceptual

approach for the development of specially designed indices. In particular, stages and/or ranking positions are weighted according to their significance from fans perspective. The application in Premiership for the past 50 seasons re-estimates the overall competitive balance to an inferior level. The further examination of the new indices proves to be a powerful tool for the an in depth analysis of competitive balance since it reveals interesting facts for league officials. To verify the usefulness of the new indices it is suggested an empirical examination under the outcome uncertainty hypothesis (Fort & Maxcy, 2003, Zimbalist, 2002).

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