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# WELFARE MAXIMIZING COMPETITIVE BALANCE: THE EVIDENCE FROM TOP EUROPEAN FOOTBALL LEAGUES

## Abstract:

In this paper we consider the pattern of competitive balance and the share of gate receipts in the top 5 European football leagues and the Scottish Premier League. Based on empirically identified preferences of fans in these leagues from different studies, we aim to identify whether the change of competitive balance moves the league towards or away from the welfare maximizing competitive balance. We have identified the reduction of competitive balance in Serie A and the English Premier League (EPL) in the seasons 2010/11-2018/19. In Serie A, this change of competitive balance does not reduce welfare, while it reduces welfare in EPL. There is also the reduction of competitive balance in Ligue 1, that does not make stadium fans worse off, but possibly reduces the surplus of media fans. In the other considered leagues, there is no trend of competitive balance, and we can only identify welfare consequences of the change of competitive balance in some sub-periods.

## Keywords:

Football leagues, competitive balance, fan preferences, welfare maximization

**JEL Classification:** L83

## Introduction

Competitive balance (CB) is one of the most important issues in sports economics. Many theoretical papers have tried to determine the equilibrium level of CB in open and closed leagues and how revenue sharing affects CB. Many empirical papers have identified preferences of stadium and TV fans for CB in different sports. According to the uncertainty of outcome hypothesis, higher CB attracts more fans. But this hypothesis is not confirmed by the data in some of the most important European football leagues. In general, these studies find that stadium fans with seasonal tickets prefer competitive imbalance, while TV audience prefers CB. Based on this result, theoretical models are constructed aiming to determine the welfare maximizing level of CB for assumed preferences, and its relationship with the equilibrium level of CB. The objective of our research is to identify if there is a trend of CB in the main European football leagues, and a trend for the share of gate receipts in teams' revenue for seasons 2010/11-2018/19. Based on the empirically identified preferences of stadium and media fans in each league and trends of CB and the share of gate receipts, we will try to determine whether the change of CB in the considered period is welfare improving or not.

Measuring CB is not a trivial task. The approach that dominated in sports economics literature was to calculate relative standard deviation as the ratio of the actual standard deviation of the share of points won by teams and the idealized standard deviation that is obtained under the assumption of perfect CB. However, this measure cannot be used to compare leagues with different number of teams and rounds due to its adverse behavior for changes in these parameters. Actual standard deviation of the share of points is more robust measure of CB. In our research, we have chosen normalized HHI that takes in consideration the size of a league and the season length. The additional reason for choosing normalized HHI is that it is related to the ideal measure of CB (adjusted normalized HHI).

Due to the fact that in the top 5 European football leagues, the share of gate receipts is constant or declining, we have included in the analysis the Scottish Premier League where the share of gate receipts is high and has the upward trend. The challenge for this league was to construct the normalized HHI. We have constructed the normalized HHI for this league in a different manner, since the general result for leagues with balanced schedule cannot be applied.

The rest of the paper is organized as follows. In the second part, we provide the literature review about the optimal level of CB. In the third part, we explain the methodological issues of measuring CB. In the fourth part, our main findings are presented. The last section concludes the discussion.

## Welfare maximizing competitive balance

The welfare maximizing level of CB in profit maximizing leagues dominated by seasonal tickets was determined by Fort and Quirk (2011). Suppose that there are $N$ teams in the league and that $\omega_i$ is the winning probability of team $i$. The market price for a unit win percentage is $p$. Since the assumption is that one additional unit of talent increases the win percentage by one unit, $p$ could be also considered as the price of a unit of talent of team $i$, $t_i$. As a consequence, the marginal revenue product of $\omega_i$ is also the marginal revenue product of the unit of talent (which is downward sloping), and it represents the factor demand for talent. The ticket price is an increasing function of the wining probability $t_i(\omega_i)$, and the demand for seasonal tickets of team *i* is $D_i(t_i(\omega_i), \omega_i)$ which is strictly decreasing in the first argument and strictly increasing in the second argument. It is also assumed that for any $\omega_i$, $t_i(\omega_i)$ is set at the optimal level to maximize revenue. The profit function of team *i* is:

$$\pi_i = t_i(\omega_i)[D_i(t_i(\omega_i), \omega_i)] - p\omega_i \,. \tag{1}$$

The first order condition for profit maximization gives:

$$\frac{d\pi_i}{d\omega_i} = t_i(\omega_i)\frac{\partial D_i(t_i(\omega_i), \omega_i)}{\partial \omega_i} - p = 0\,. \tag{2}$$

Since the ticket price is set optimally, there is no second element in the derivative of the revenue function. The above condition holds for any team, and in equilibrium, their marginal revenue products must be equal:

$$MRP_i^e = MRP_j^e\,. \tag{3}$$

This determines the equilibrium winning probability $\omega_i^e$ and the equilibrium ticket price $t_i(\omega_i^e)$. The wining probabilities are ranked according to the teams' indices, and a team with a higher index has a higher probability of winning, $\omega_i > \omega_j$, for any *i>j*. This assumption implies that we have a certain competitive imbalance in equilibrium with $\omega_i^e > \omega_j^e$ and $t_i^e > t_j^e$ for any *i>j*.

Consumer's surplus of fans of team *i* in this market is $C_i = \int_{t_i}^{\infty} D_i(t_i, w_i)dt_i$ and the surplus of team *i* is $R_i = t_i(\omega_i)[D_i(t_i(\omega_i), \omega_i)]$. In order to obtain the welfare maximizing CB, Fort and Quirk (2011) maximize total surplus subject to the constraint that the total number of wins is *n*/2. Therefore, we have the following Lagrangean function:

$$L = \sum_{i=1}^{n}(C_i + R_i) + \lambda(\sum_{i=1}^{n}\omega_i - n/2)\,. \tag{4}$$

The first order condition with respect to the winning probability yields:

$$\int_{t_i*}^{\infty}\frac{\partial D_i}{\partial \omega_i}dt_i - MRP_i* + \lambda = 0\,, \tag{5}$$

where (*) denotes the value of the parameters at the social optimum. Therefore, the social planer's level of CB is determined when:

$$MRP_i* - MRP_j* = \int_{t_j*}^{\infty}\frac{\partial D_j^*}{\partial \omega_j}dt_j - \int_{t_i*}^{\infty}\frac{\partial D_i^*}{\partial \omega_i}dt_i\,. \tag{6}$$

Due to the assumptions that $\omega_i > \omega_j$, and $\partial^2 D_i / \partial \omega_i^2 < 0$, for any *i>j*, we have that $\partial D_i / \partial \omega_i < \partial D_j / \partial \omega_j$. However, the sign of the right-hand side of (6) depends also on the limits of integration since $t_i^* > t_j^*$. If the right-hand side of (6) is positive, this means that the marginal impact of additional unit of talent on spectator's surplus is larger for smaller teams than for larger teams, and the welfare is maximized with higher level of CB than in equilibrium. If the right-hand side of (6) zero, then the CB in welfare optimum coincides with the equilibrium level of CB. Finally, when the right-hand side of (6) is negative, the social optimum requires lower level of CB than in equilibrium.

In the same setup, Fort and Quirk (2010) analyze single-ticket leagues (such as MLB), where the sale of individual tickets dominates over seasonal tickets. The main difference is that now the ticket price depends on both home and away team wining probability. The problem of finding the equilibrium and the socially optimal level of CB is more involved, but the intuition about the relationship between the two levels of CB is the same.

In a win-max league (open league), teams aim to maximize the wining probability subject to the zero-profit constraint, which implies that teams equalize the average revenue product with the cost of talent. Vrooman (2015) shows that the equilibrium level of CB in a closed league is larger than the socially optimal, while it is lower than socially optimal in an open league. Vrooman (2015) concludes that fans in European football have preferences such that they prefer to see they favorite team winning over uncertainty of matches, and that the increasing media revenue in these leagues is an indicator that competitive imbalance is indeed optimal.

Vrooman (2012) considers equilibrium and welfare maximizing level of CB in open leagues, and proves that in media dominated leagues, equilibrium and welfare maximizing levels of CB are lower than in gate receipts dominated leagues. This result is based on the assumption that in media dominated leagues, fans prefer competitive imbalance and in gate receipts dominated leagues, fans prefer CB. In any case, the welfare maximizing level of CB, according to Vrooman (2012), is lower in media dominated leagues.

## Methodology: The measures of competitive balance

There are several measures of CB, and we will first present the measure that is familiar in the Industrial Organization literature, the HHI index. For a league with *n* teams the HHI index is defined as follows:

$$HHI = \sum_{i=1}^{n} (\omega_i / \sum_{i=1}^{n} \omega_i)^2 , \tag{8}$$

where $\omega_i$ is the number of points in a season by team *i*, and $\sum_{i=1}^{n} \omega_i$ is the total number of points by all teams in a season. Since a team cannot play against itself, this measure is less than 1. The higher the value of HHI, the lower the level of CB. If there are no ties, $\omega_i$ can represent the number of wins in a season and $\sum_{i=1}^{n} \omega_i$ the number of wins by all teams in a season. When $\omega_i$ measures the number of wins and is used in leagues where ties are often, HHI can be calculated by not taking draws in consideration in this measure or by attributing to a draw one half of a victory. Owen *et al*. (2007) have shown that the lower bound of HHI is $HHI_{lb}=1/n$, which indicates that the lower bound is higher when the number of teams in a league is smaller. To make cross-league comparisons, Depken (1999) calculates the distance of the index from the lower bound as:

$$dHHI = HHI - 1/n . \tag{9}$$

What Depken (1999) fails to recognize, is that the upper bound is also affected by the number of teams. Owen *et al*. (2007) show that the upper bound is:

$$HHI_{ub} = \frac{2(2n-1)}{3n(n-1)} . \tag{10}$$

The upper bound depends only on *n*, and is independent of *k,* the number of times one team plays against *another* team in a season. If the schedule is unbalanced, one team plays different number of times against opponents, and the upper bound should be calculated in a different manner. It is straightforward to show that the upper bound is decreasing in *n*, which means that larger leagues have lower upper and lower bound for HHI and may appear as more balanced than some leagues with smaller number of teams.

To make cross-league comparisons, by considering both the upper and the lower bound, HHI should be normalized such that its value belongs to the interval [0,1]:

$$HHI^* = \frac{HHI - HHI_{lb}}{HHI_{ub} - HHI_{lb}} = \frac{dHHI}{dHHI_{ub}} . \tag{11}$$

The measure that is independent of the season length (the number of teams *n* and the number of times the teams meet *k*), was constructed by McGee (2016):

$$\phi_r = \left[ \frac{3(\theta_r - n)}{n(k(n-1)+2k-3)} \right], \tag{12}$$

where $\theta_r = \sum_{i=1}^{n}(2\omega_i - k(n-1))^2 / k(n-1)$. McGee (2016) shows that the variance of $\phi_r$ decreases when *k* or *n* or both increase, which means that the sample value of CB converges to its population value. But the average value of $\phi_r$ is not affected by the length of the season. In addition, this measure can also be modified to be resistant to the change in unbalanced league schedules, when teams from one division meet more often than teams from different divisions. Van Scyoc and McGee (2016) show that:

$$dHHI = \frac{\theta_r}{n^2(n-1)k} . \tag{13}$$

By substituting (13) in (11) and using the fact that $dHHI_{ub} = (n+1)/[3n(n-1)]$, we obtain that:

$$HHI^* = \frac{3\theta_r}{nk(n+1)}, \tag{14}$$

or $\theta_r = nk(n+1)HHI^*/3$. By plugging in the last result in (12), Owen and Owen (2017) obtain the relationship between McGee's (2016) measure of CB (adjusted HHI*) and HHI*:

$$adjHHI^* \equiv \phi_r = \left[ \frac{k(n+1)HHI^* - 3}{k(n-1)+2k-3} \right] = \left[ \frac{k(n+1)HHI^* - 3}{k(n+1)-3} \right]. \tag{15}$$

By using the simulations with different levels of population CB, Owen and Owen (2017) show that in the generated sample data, HHI* underestimates the population level of CB, and this bias diminishes as *n* and *k* increase. When there is the complete CB or moderate imbalance in the population, adjusted HHI* shows lower degree of underestimation of CB in the generated data sample than HHI*, but when the CB in the population is low, there is no significant reduction of bias with adjusted HHI*.

The other widely used measure of competitive balance is actual standard deviation of win percentages (ASD). When ties are possible, and when the points system is (3,0,1), 3 for win, 1 for draw, and 0 for loss, the expected number of points should be calculated in the following manner, which is the first step to determine ASD. If the probability of a draw is *d*, then the probability of a win or loss is (1-*d*)/2. Owen (2010) proves that the expected number of points in a match and the variance of the total number of points in a season are:

$$E[\omega_i] = [3((1-d)/2)] + d + [0((1-d)/2)] = (3-d)/2 . \quad (16)$$

$$nV(\omega_i) = n[[((1-d)/2)(3-(3-d)/2)^2] + d(1-(3-d)/2)^2 +$$

$$+[((1-d)/2)(0-(3-d)/2)^2]] = n(1-d)(d+9)/4 . \quad (17)$$

The expected number of points in a season is obtained by multiplying (16) with *n*, and expected share of points is obtained by dividing expected number of points with the maximal number of points that could be obtained, 3*n*:

$$nE[\omega_i / 3n] = n[(3-d)/2]/3n = (3-d)/6 . \quad (18)$$

The variance of the share of the points is:

$$V(\omega_i / 3n) = nV(p_i)/9n^2 = (1-d)(9+d)/36n . \quad (19)$$

The idealized standard deviation, ISD, which assumes perfect CB is:

$$ISD = \sqrt{(1-d)(9+d)/36n} . \quad (20)$$

Typically, the probability of a draw is calculated based on the actual probability of a draw in a series of seasons in a certain league. For example, Owen (2010) takes *d*=0.25 which is based on more than a century long series of data from the English league.

When there are draws in a league, with the system of points (3,1,0), ASD is calculated as follows according to Owen and King (2015):

$$ASD = \sqrt{\sum_{i=1}^{n}[(\omega_i / 3k(n-1)) - (3-d)/6]^2 / (n-1)} . \quad (21)$$

The measure that is also widely used in the literature is the ratio of ASD and ISD that is called relative standard deviation, RSD.

In the simulation analysis, Owen and King (2015) compare the behavior of ASD and RSD for different values of *n* and *k*. They assume different levels of population CB and generate the sample data. When there is a complete CB in the population, ASD underestimates the true level of CB, but this bias is reduced when *n* or *k* increase. RSD is unbiased estimator of the true population level of CB, and its probability density function is not affected by the change of *n* or *k*. When there is moderate or high level of CB in the population, ASD underestimates the true level of CB, but the bias is again reduced when *n* or *k* increase. The behavior of RSD when *n* or *k* increase, make it completely unacceptable measure of CB, since its probability density function moves to the right implying the divergence of the estimated value of CB from the true value of the population CB. Hence, unless the league is completely balanced, ASD is a better estimator of the true level of CB. Comparisons across leagues may give false conclusions when comparing CB for different values of *n* or *k*.

## Results

For measuring CB, we have used HHI based on the share of wins of each team in the total number of wins in a season and HHI based on the share of points of each team in the total number of points collected by all teams in a season. To make comparisons simpler, the share of each team is expressed in % (3%) instead in decimal values (0.03). Hence, the HHI belongs to the interval between $HHI_{lb}$ x 10.000 and $HHI_{ub}$ x 10.000, for the previously defined lower and upper bounds. When the value of HHI is higher, CB is lower. The HHI is calculated for the top European football leagues (Serie A, La Liga, English Premier League-EPL, Ligue 1, and Bundesliga). In addition, we have extended the analysis to the Scottish Premier League-SPL. Serie A, La Liga, EPL and Ligue 1 have 20 teams each, while Bundesliga has 18 teams and SPL has 12 teams. From the season 2010/11, the SPL has increased the number of teams from 10 to 12. In order to have the same number of games as the main European leagues, 38, all teams play 3 times against each other for a total of 33 games. At that point, the league is split in the Championship league with the first 6 teams and the Relegation league with the next 6 teams. The teams play against each other once in each part of the league, which gives the total of 38 games.

The values of HHI are not comparable for leagues with different number of teams. Based on the value of HHI for the share of points, a flawed conclusion could be drawn that the average level of CB for seasons 2010/11-2018/19 is lower in Bundesliga (HHI=610.03), than in Serie A (HHI=555.55), La Liga (HHI=556.09) and EPL (HHI=554.99). This false conclusion stems from the lower number of teams in Bundesliga, which increases both the upper and lower bound of HHI. Hence, we have calculated the lower and upper bound of HHI for each league. The lower bound is simply 1/*n* x 10.000 for all leagues, for both wins and points percentage. The upper bound for leagues with balanced schedule is calculated according to (10). For SPL with unbalanced schedule, $HHI_{ub}$ is calculated differently such that its value is 1128. By using these values, HHI is normalized according to (11) with the value in the interval between 0 and 1. After this transformation, it turns out that Bundesliga has a higher level of average CB based on the share of points in the considered period (HHI*=0.263) than EPL (HHI*=0.298), Serie A (HHI*=0.302) and La Liga (HHI*=0.304). Nevertheless, HHI* still underestimates the true level of CB, particularly when the level of CB in the population is high.

To eliminate this bias, HHI* is transformed according to (15). When we consider the data for season 2018/19, the adjustment factor for HHI* based on the share of points in EPL is HHI*-*adj* HHI*=0.398-0.352=0.046, and for La Liga 0.188-0.125=0.063, which implies that the higher the level of CB, the higher the adjustment.

In the subsequent analysis we had to choose between *adj* HHI* based on the share of wins (where draws are ignored) and adjusted HHI* based on the share of points. The average values for seasons 2010/11-2018/19 of both measures are shown in Table 1.

**Table 1. Average values of adjusted HHI* (share of wins and points), seasons 2010/11-2018/19**

| *adj* HHI* | EPL | Serie A | La Liga | Ligue 1 | Bundesliga | SPL |
|---|---|---|---|---|---|---|
| wins | 0.4453 | 0.449 | 0.4618 | 0.3411 | 0.3971 | 0.443 |
| points | 0.2446 | 0.2478 | 0.2509 | 0.1662 | 0.2 | 0.2913 |

*Source: author & web sites of the Football leagues*

It is evident that adjusted HHI* based on the share of wins gives considerably higher values than adjusted HHI* based on the share of points. So, the former measure underestimates the population level of CB, and suggests that draws should be also included to measure CB properly. In addition, the correlation between two adjusted HHI* measures is 0.88 for EPL, 0.9 for Serie A, 0.95 for La Liga, 0.9 for Bundesliga, but only 0.35 for Ligue 1 and 0.43 for SPL. These observations imply that the measure based on the share of points should be used in the further discussion (Table 2).

**Table 2. Adjusted HHI* based on the share of points in seasons 2010/11-2018/19**

| *adj* HHI* | EPL | Serie A | La Liga | Ligue 1 | Bundesliga | SPL |
|---|---|---|---|---|---|---|
| 2010/11 | 0.0944 | 0.1536 | 0.2005 | 0.0732 | 0.1065 | 0.3829 |
| 2011/12 | 0.2312 | 0.1558 | 0.2076 | 0.1413 | 0.2052 | 0.2871 |
| 2012/13 | 0.2542 | 0.2271 | 0.2368 | 0.1123 | 0.2393 | 0.0858 |
| 2013/14 | 0.2889 | 0.3042 | 0.2574 | 0.1941 | 0.283 | 0.3703 |
| 2014/15 | 0.1939 | 0.2035 | 0.3699 | 0.1447 | 0.1498 | 0.559 |
| 2015/16 | 0.1711 | 0.2256 | 0.2545 | 0.1614 | 0.219 | 0.103 |
| 2016/17 | 0.3156 | 0.341 | 0.3508 | 0.2351 | 0.1576 | 0.2924 |
| 2017/18 | 0.2998 | 0.3429 | 0.2552 | 0.2387 | 0.1645 | 0.2435 |
| 2018/19 | 0.352 | 0.2766 | 0.1256 | 0.1951 | 0.2755 | 0.2983 |

*Source: author & web sites of the Football leagues*

Based on the average values of adjusted HHI* for the share of points in Table 1, Ligue 1 has the largest level of CB, followed by Bundesliga. EPL, Serie A and La Liga have similar level of CB, and lower level of CB than Bundesliga, while SPL has the lowest level of CB. To clarify the robustness of adjusted HHI* as a measure of CB, we have calculated ASD of the share of points for Serie A, where the expected share of points is calculated based on (16). The probability of a draw is based on historical frequency of draws in the 9 considered seasons, which is 0.2729. The correlation between adjusted HHI* for Serie A and ASD is almost perfect, 0.9977. We have not used RSD as a measure of CB due to its undesirable properties for comparing leagues of different sizes.

We have also considered the share of gate receipts in total revenue of all teams. The share of gate receipts is declining in the top 5 leagues, and only has an upward trend in the SPL (Table 3).

**Table 3. Share of gate receipts in total revenue in seasons 2009/10-2018/19**

| | EPL | Serie A | La Liga | Ligue 1 | Bundesliga | SPL |
|---|---|---|---|---|---|---|
| 2009/10 | 0.2143 | 0.125 | 0.281 | 0.11 | 0.2416 | ---- |
| 2010/11 | 0.2117 | 0.122 | ---- | 0.1 | 0.2343 | ---- |
| 2011/12 | 0.2118 | 0.109 | 0.269 | 0.09 | 0.222 | ---- |
| 2012/13 | 0.216 | 0.108 | 0.245 | 0.08 | 0.2212 | ---- |
| 2013/14 | 0.1972 | 0.096 | 0.244 | 0.08 | 0.1829 | ---- |
| 2014/15 | 0.1985 | 0.12 | 0.227 | 0.1 | 0.1742 | 0.34 |
| 2015/16 | 0.1626 | 0.11 | 0.243 | 0.1 | 0.1690 | 0.37 |
| 2016/17 | 0.1493 | 0.11 | 0.204 | 0.08 | 0.1341 | 0.37 |
| 2017/18 | 0.1412 | 0.113 | 0.166 | 0.1 | 0.1377 | 0.4 |
| 2018/19 | 0.1294 | 0.105 | ---- | 0.126 | ---- | 0.43 |

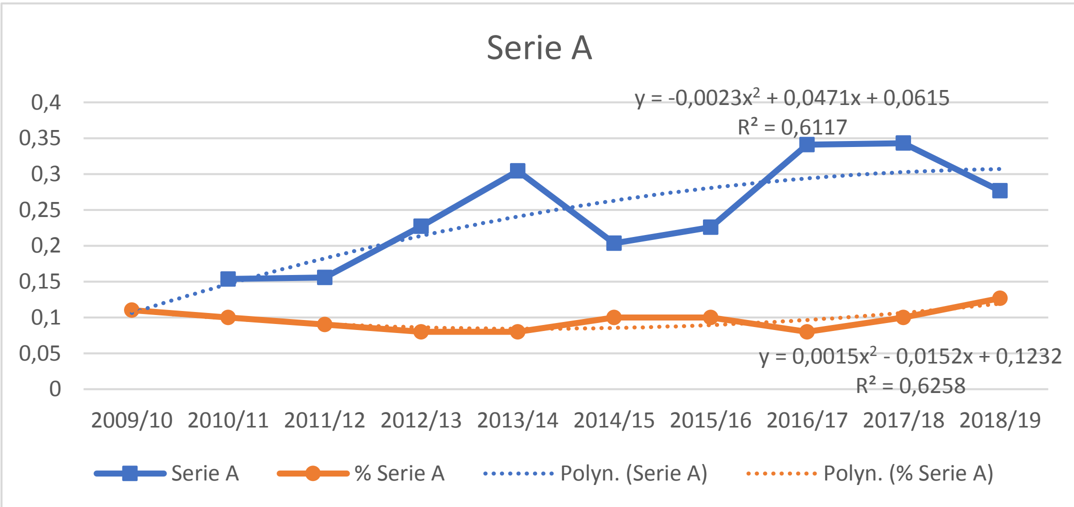
*Source: Deloitte Football Money League*

Among the considered leagues, Italy and France have the lowest share of gate receipts which is almost constant in the considered period. In Germany and England, the share is declining following almost the same path, but the share of gate receipts is at the higher level than in Italy and France. In Spain, the share also has a downward trend, but its level is higher than in Germany and England. Finally, the SPL is the only league where the share of gate receipts is rising and it is considerably higher than in other leagues.

We will now combine the data about the adjusted HHI* (Serie A) for the share of points and the share of gate receipts (% Serie A) to infer if there is a trend in the behavior of each series. Figure 1 shows the situation in Serie A.

There is a clear polynomial upward trend for the adjusted HHI* implying the reduction of CB. On the other hand, the share of gate receipts is almost constant in the considered period, but the share of media revenue is rising. To draw welfare implications of the change of CB and whether the league is moving towards or further away from its welfare maximizing level, we will use the empirically determined facts about preferences of fans in different leagues. According to Caruso *et al*. (2019), in Serie A CB does not have an impact on media fans, while Bond and Addesa (2020) have determined the positive impact of CB on stadium fans who buy match-day tickets. Hence, the reduction of CB does not hurt media fans, and reduces the welfare of stadium fans who buy match-day tickets. Since Serie A has a low share of gate receipts, the reduction of CB does not reduce total welfare.

**Figure 1. Adjusted HHI* and the share of gate receipts for Serie A- seasons 2010/11-2018/19**

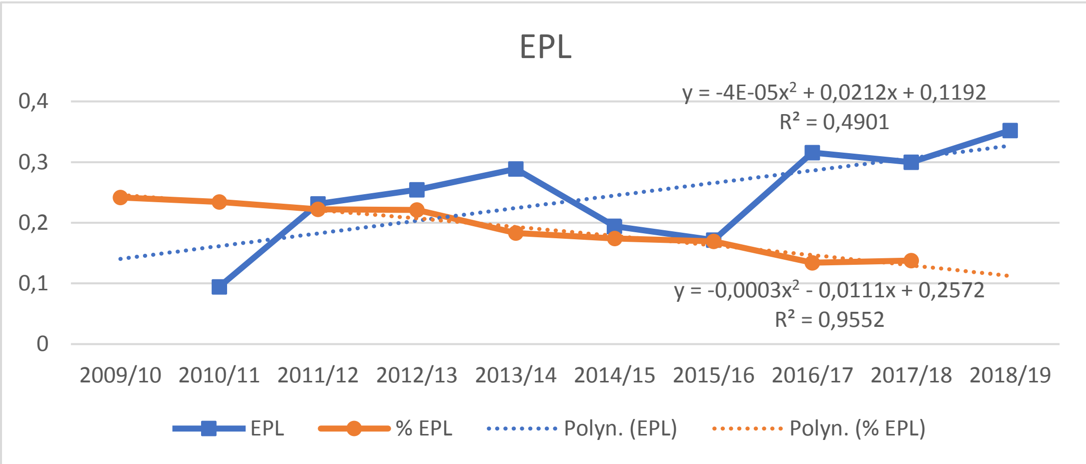



*Source: author & Deloitte Football Money League*

Figure 2 shows the data for adjusted HHI* in the EPL (EPL) and the share of gate receipts (% EPL).

There is the upward polynomial trend of adjusted HHI* implying reduction of CB in the EPL. The share of gate receipts has the downward polynomial trend and the share of media revenue is rising. Cox (2018) finds that in the Premier league, as the probability of draw increases, the stadium attendance decreases. This result shows that stadium fans have preferences for imbalance. In contrast, when the probability of draw increase, the TV audience increases suggesting that these fans have preferences for CB. In addition, stadium attendance increases with the number of goals scored by home team, while the TV audience increases with the number of goals scored by the away team. There is also the substitution effect, the reduction of stadium attendance, when the match is broadcasted. These results are aligned with the previous research of Forrest *et al.* (2005) who find that the TV audience in the Premier league increases with the uncertainty of outcome (and also in the total amount of talent in a game), but the effect on the willingness to pay of broadcasters for higher uncertainty of outcome is not very large. This suggests that imposing rules that would increase CB in any particular match (like the rules in closed leagues) would not significantly increase the pooled broadcasting revenue of teams. Hence, the reduction of CB in EPL observed in our data benefits to stadium fans, but makes media fans worse off. The implication is that with the declining share of gate receipts and increasing share of media revenue, the league moves further away from the welfare optimum.

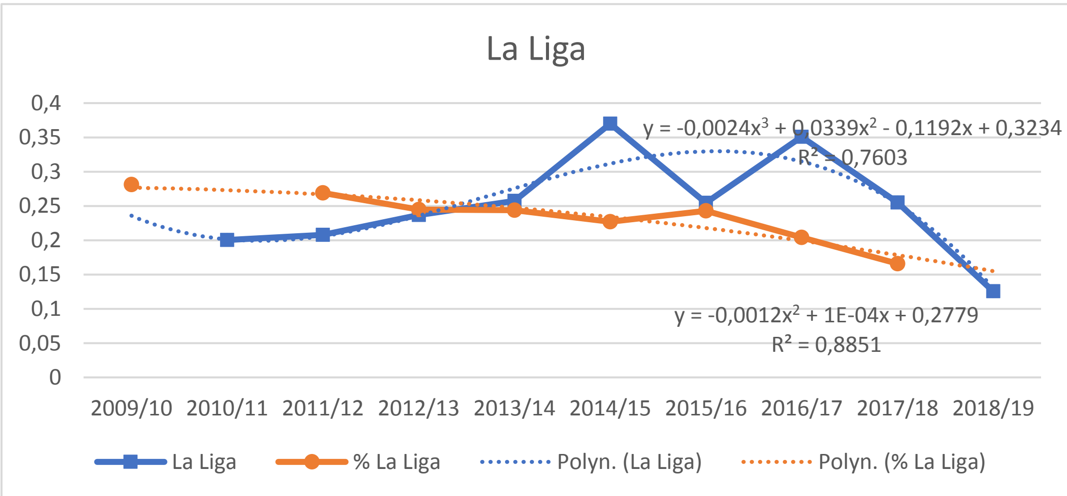
**Figure 2. Adjusted HHI* and the share of gate receipts for EPL in seasons 2010/11-2018/19**




*Source: author & Deloitte Football Money League*

Figure 3 shows the data for adjusted HHI* in La Liga (La Liga) and the share of gate receipts (% La Liga).

**Figure 3. Adjusted HHI* and the share of gate receipts for La Liga in seasons 2010/11-2018/19**



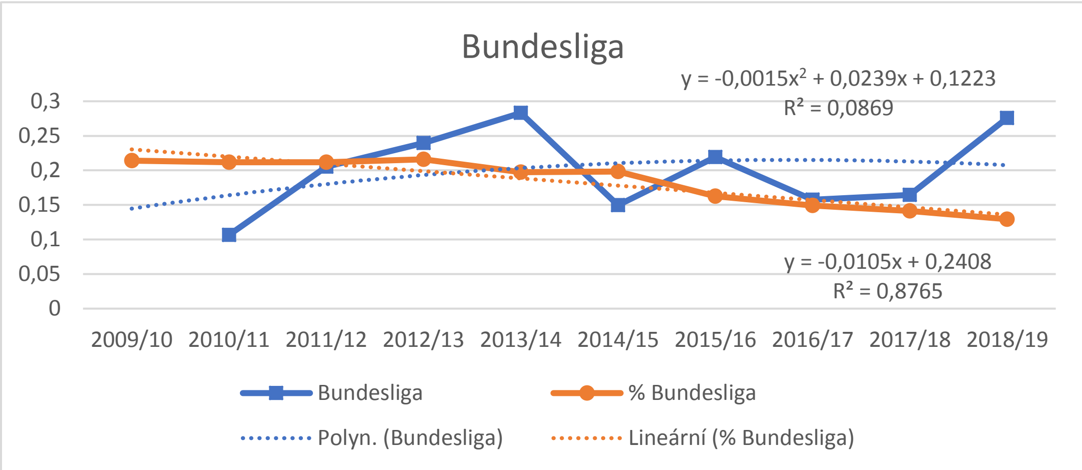

*Source: author & Deloitte Football Money League*

It is not possible to identify a clear trend of the adjusted HHI* in La Liga. Only in the last 3 seasons CB is increasing. The share of gate receipts is constantly declining. According to Buraimo and Simmons (2009) stadium fans in La Liga prefer competitive imbalance, while media fans prefer CB.

Since there is no trend for CB for all the considered period, we can only say that in the last 3 seasons, the increase of CB benefits to media fans and makes stadium fans worse off. Since the share of gate receipts is declining, the increase of CB in the last 3 seasons moves the league towards the welfare optimum.

Figure 4 shows adj. HHI* in Bundesliga (Bundesliga) and the share of gate receipts (% Bundesliga).

**Figure 4. Adjusted HHI* and the share of gate receipts: Bundesliga- seasons 2010/11-2018/19**

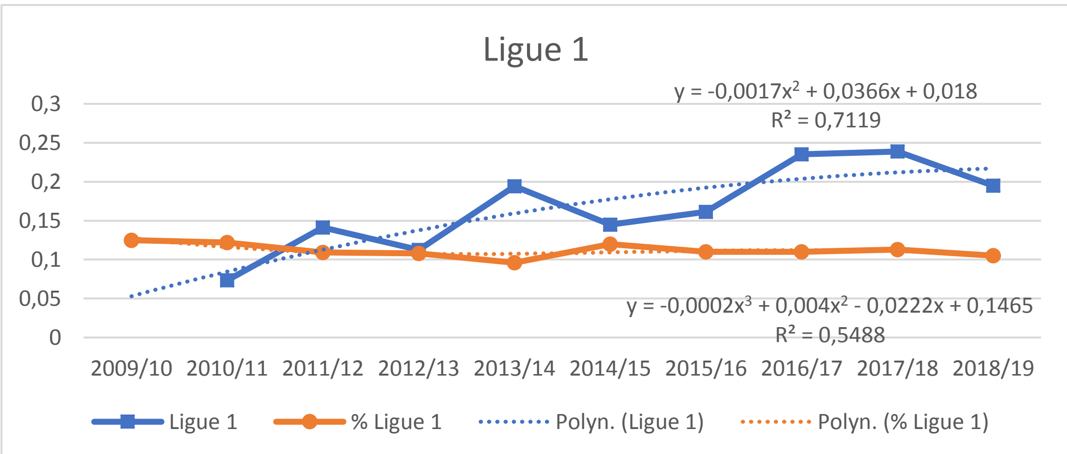



*Source: author & Deloitte Football Money League*

In Bundesliga there is no trend for CB, we can only identify the reduction of CB in the last 3 seasons. There is an evident linear trend for the reduction of the share of gate receipts in the considered period. Pawlowski and Anders (2012) show that the increase of match uncertainty reduces stadium attendance in Germany and that when there is less match uncertainty, stadium attendance increases. This result is aligned with the findings of Czarnitzki and Stadtmann (2002) who also do not find evidence that stadium attendance in Bundesliga increases with the uncertainty of the match or the uncertainty of the championship. We can only conclude that the reduction of CB in the last 3 seasons does not make stadium fans worse off.

Figure 5 shows the adjusted HHI* in Ligue 1 (Ligue 1) and the share of gate receipts (% Ligue 1).

**Figure 5. Adjusted HHI* and the share of gate receipts for Ligue 1 in seasons 2010/11-2018/19**

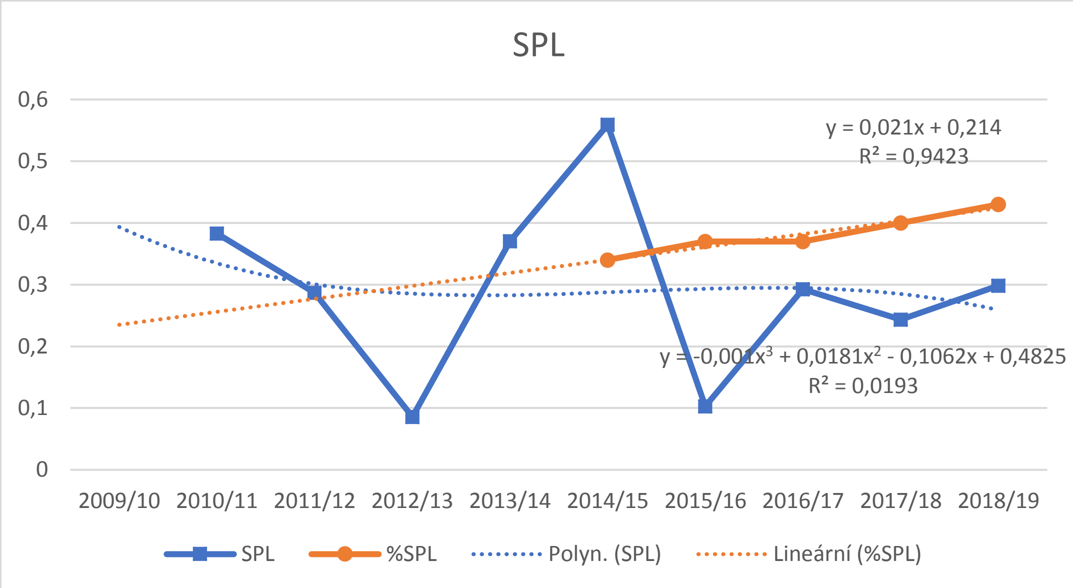



*Source: author & Deloitte Football Money League*

There is a clear polynomial trend of the reduction of CB in Ligue 1, while the share of gate receipts is slightly decreasing. Concerning match attendance in Ligue 1, Scelles *et al*. (2013) find that CB, measured as the difference in points between two teams in a game, does not have a significant impact on stadium attendance. There is no known study of preferences of French media fans. Hence, the reduction of CB does not make stadium fans worse off.

Figure 6 shows the data for adjusted HHI* in SPL (SPL) and the share of gate receipts (% SPL).

**Figure 6. Adjusted HHI* and the share of gate receipts for SPL in seasons 2010/11-2018/19**




*Source: author & Deloitte Football Money League*

There is no trend of CB in SPL, and it shows the highest volatility among the considered leagues. The share of gate receipts is rising and it is at the highest level among the 6 analyzed leagues. We don't have empirical studies about preferences of Scottish fans, but due to the high volatility of CB, their risk aversion is also an important factor to determine the change of their utility due to the change of CB.

## Conclusion

We have studied the evolution of CB in football leagues from the welfare perspective of stadium and media fans. In the majority of empirical studies, stadium fans prefer competitive imbalance while media fans prefer CB. However, in Serie A media fans are not worse off with the lower level of CB. Since in the top 5 European football leagues the share of media revenue in total revenue is rising, and the share of gate receipts is constant or decreasing, the change of CB mainly affects the welfare of media fans.

This type of welfare analysis is important for league authorities as well as for competition authorities who can change the rule for the allocation of media revenues as the most important instrument for the regulation of the level of CB. In open leagues there are no other instruments like salary caps that exist in closed leagues. For example, if in a media dominated league media fans prefer CB, while there is a trend of the reduction of CB, the league authorities should change the allocation rule for sharing media revenues, increasing the part of pooled media revenue that is shared on equal basis and reducing the share that is allocated based on the results or fan base.

We have also considered one gate receipts dominated league, the SPL. If stadium fans prefer competitive imbalance, which is the case with the majority of football leagues, the reduction of CB should not be altered with the policy of sharing gate receipts. This policy would reduce fans' welfare in this case.

As it is the case in competition policy where each case should be studied separately to determine the change of consumers' and overall welfare, the same logic applies to the analysis of CB in football leagues. The most important element for measuring the impact of CB on fans' welfare is to determine fans' preferences.

The important issue is also how CB is measured. The most widely used measure in the literature, RSD, cannot be used for comparing the level of CB in one league after the change of the number of teams. This measure also cannot be used for comparing CB in leagues with different number of teams and different season length. Hence, using this measure can lead to wrong conclusions and inappropriate policy changes of the league authorities.

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