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A DIE-HARD ARISTOCRACY: COMPETITIVE BALANCE IN ITALIAN SOCCER, 1929-2009

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SUMMARY: 1. Motivation and research question – 2. Literature review – 3. The database – 4. Two Herfindahl indexes to measure competitive balance – 5. A self-reinforcing mechanism? – 6. The innovative push from newly-promoted clubs – 7. Conclusions

JEL CLASSIFICATION: C40, D40, L83

KEYWORDS: *competitive balance, professional soccer, Herfindahl index, Pareto regression*

1. *Motivation and research question*

There are three levels of competitive balance (CB) in professional sports.[1] The lowest is the uncertainty of the outcome of the match – what essentially makes the event entertaining for the public. At the intermediate level is the competitive balance in the season, measured by an index which accounts for differences in

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[1] See S. SZYMANSKI, *The Economic Design of Sporting Contest*, in *J. Econ. Lit.*, vol. XLI, December 2003, 1137-1187, and J. BORLAND, R. MACDONALD, *Demand for Sports*, in *Oxford Review of Economic Policy*, vol. 19, no. 4, 2003, 478-502.

points gained; this is the uncertainty of a club's end-of-season ranking. The highest level is the uncertainty generated by long-term rivalry between clubs for the trophies and titles won over the years. In this paper we will primarily focus on the intermediate and top levels.

The impetus to investigate CB in Italian professional soccer came from the recent changes in the Italian league – *Lega Nazionale Professionisti* (*Lega Calcio* for short) – effective as of season 2010/11 for *Serie A* clubs, with the introduction of the revenue sharing rule.

The new sharing rule includes a club's history among the criteria in the redistribution of revenues from the sale of broadcasting rights; it gives relatively more weight to historical rather than to seasonal results (a weight of 25% versus 5%). The new rule has ample scope. Firstly, it pursues mutualisation, so 10% of total revenues goes to second division (*Serie B*) clubs, and sustains investments in societal aspects (e.g. home-grown players, stadium expenses). Secondly, out of the remaining 90%, a parachute of €15 million goes to the three clubs relegated to *Serie B*, as repayment for the extra expenses sustained in having played in *Serie A*. Finally, any remainder is used to pursue CB and is distributed as follows: a) 40% is equally shared among the twenty clubs; b) 25% according to the fan base; c) 5% as per the town population from an official census; d) 10% on the basis of the club's sporting history since season 1946-47 until five seasons before; e) 15% according to a club's five season record; f) 5% on the basis of their end-of-season ranking. Sporting results are counted according to the so-called «British rule» (points awarded according to final position, in descending order, e.g. 20-19-18…3-2-1).

Note that points b) and c) reward market share and overlap considerably, except for bigger clubs, whose fan-base can extend far beyond their town and county of origin, in which cases point b) is substantially different from c). Points d) and e) concern the history of the club, and f) fosters the incentive to win and seasonal CB. Indeed, all of the points are interconnected. To start with, the history of Italian soccer is characterized by «deep-pocket entrepreneurs» who often invest in clubs for self-promotion and personal utility-maximization, and whose presence is more likely in bigger towns. A winning team makes the club more attractive for players and fans and so it captures a larger share of the market (points b) and c)). This in turn induces a self-reinforcing mechanism according to which one team dominates by winning multiple consecutive championships, or else enjoys a consistent streak of high final rankings (hence earning more from d), e), and f)).

The focus of this paper is on d), e), and f). Our aim is to present and analyse two measures of CB (seasonal and historical) and then use them to illustrate the appropriateness of points d) and e), as compared to f), in addressing the question of competitive balance. The indexes can be used to evaluate the appropriateness of the weight given to point f). To do so we have to investigate 1) an inequality in the distribution of historical sporting results in Italian soccer; 2) a correlated question concerning the innovative push induced by promoted clubs, which interacts with inequality.

The structure of the paper is as follows. Section two will distinguish our contribution from extant literature, while section three will look at some of the problems we faced in developing the database. In section four we present and comment upon the two indexes. In sections 5 and 6 we deal with the self-reinforcing mechanism. Section 7 concludes the paper.

2. *Literature review*

The adoption of the above-mentioned sharing rule by *Lega Calcio* is the last in a series of events originating from the fact that the commercialisation of sports has attracted the interest of European politics.[2]

The interests of the European Union (EU) as a supra-national antitrust agency were boosted by the so-called Bosman ruling of the European Court of Justice in 1995. The EU started fostering competitive balance as a part of its level-playing-field strategy in professional sports, with its main focus on soccer. Broadcasting rights have become a tool to pursue this policy, so the Presidency of the EU has commissioned a study to underline the need for the collective sale of media rights to reinforce CB and mutualisation.[3] The study recommends that the EU institutions provide clear guidance on sport-related rules related to CB (i.e. the presence of home-grown players, the collective marketing of commercial rights and other systems of cost control), and to provide appropriate legal instruments to permit centralized marketing and an effective system for maintaining CB through cost control.

In line with this orientation, Italian law has imposed a change from an individual to a centralized sale of television rights in professional soccer and forced the adoption of a sharing rule to promote CB,[4] despite the fact that the relationship between CB and demand is not clear-cut and still controversial on empirical grounds.[5] In an another paper we show that historical record is deemed an irrelevant variable by the broadcaster.[6]

Competitive balance is widely deployed as an instrument of analysis in investigating the economic fundamentals of the industry. One strand of the literature focuses on the impact of the Bosman ruling not only on soccer, but also on other

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[2] See B. Gerrard, *Competitive Balance and the Sports Media Rights Market: What Are the Real Issues?* in C. Jeanrenaud and S. Késenne (eds), *The Economics of Sport and the Media,* Edward Elgar (Cheltenham UK), 2006; and R.G. Noll, *Broadcasting and Team Sports*, in *Scottish J. Political Economy*, vol. 54, no. 3, July 2007, 400-21.

[3] The study is by J.L. Arnaut, *Independent European Sport Review 2006*, downloadable from: www.independenteuropeanfootballreview.com/doc/Full_Report_EN.pdf, 2006.

[4] Italian readers can see Legge 19 luglio 2007, n. 106, in Gazz. Uff. n. 171 del 25 luglio 2007 and Decreto legislativo 9 gennaio 2008, n. 9, in Gazz. Uff. n. 27 del 1 febbraio 2008.

[5] A strong evidence against the relevance of CB is offered by M. Di Domizio, *Competitive balance e audience televisiva*, in *Riv. Dir. Ec. Sport*, vol. VI, no. 1, 2010, 27-57.

[6] See P. Di Betta, C. Amenta, *The Demand for Italian Soccer: Broadcaster-based Market Segmentation, and Scale and Scope Economies*, University of Palermo (Italy), working paper, 2009.

other sports.[7]

Some studies have focussed on the impact of CB on match demand. Brandes and Franck have presented a vector autoregression analysis on the four major European soccer leagues.[8] Schmidt and Berri have shown that CB increases attendance at the ball-park, using the Gini coefficient to distinguish a short-term and a long-term effect. Paul and Weinbach have presented evidence based on television ratings for individual games showing that uncertainty of outcome is one important factor in attracting (start-of-game) and keeping viewers (within-game).[9] Koning has compared team and individual sport demands and CB.[10] These studies are outside the scope of our paper.

Others focus on CB as an instrument for the leagues to improve the sport's level of attractiveness. The research question concerns how match uncertainty translates into season results (seasonal CB), thus echoing Rottenberg, who sustained that: «The nature of the industry is such that competitors must be of approximate equal "size" if any are to be successful».[11] Rebeggiani and Tondani focus on the choice between open and closed-ended league in professional cycling.[12]

Mutualisation and CB are closely related, so policies such the salary cap, the draft system, and the revenue sharing rule have been looked at to see how they interact with CB. Palomino and Rigotti point out that the league's objectives may be either to maximize the demand for the sport (as in many European leagues) or to maximize the teams' joint profits, as in many leagues in the United States, wherein revenue sharing does not affect CB.[13] Whereas a full sharing of revenues is optimal for the latter, a league looking for an increase in the sports attractiveness

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[7] See the extensive study by Haan *et al.*, who compare the situation before and after the ruling in seven countries: M. HAAN, R. H. KONING, A. VAN WITTELOOSTUIJN, *Competitive Balance in National European Soccer Competitions*, in J. ALBERT, R. H. KONING (eds), *Statistical Thinking in Sports*, Chapman & Hall, Boca Raton (FL USA), 2008, 63-76. For basketball, see F. ADDESA, *Il competitive balance nel campionato italiano di basket*, in *Riv. Dir. Ec. Sport*, vol. V, no. 2, 2009, 87-109. For volleyball, see R. CARUSO, I. VERRI, *Competitive balance dopo la sentenza Bosman: il caso della pallavolo in Italia*, in *Riv. Dir. Ec. Sport*, vol. V, no. 1, 2009, 59-79.

[8] L. BRANDES, E. FRANCK, *Who Made Who? An Empirical Analysis of Competitive Balance in European Soccer Leagues*, in *Eastern Economic Journal*, vol. 33, no. 3, 2007, 379-402.

[9] M. B. SCHMIDT, D. J. BERRI, *Competitive Balance and Attendance: the Case of Major League Baseball*, in *J. Sports Economics*, vol. 2, no. 2, 2003, 145-167; R. J. PAUL, A. P. WEINBACK, *The Uncertainty of Outcome and Scoring Effects on Nielsen Ratings for Monday Night Football*, in *J. Econ. and Business*, vol. 59, 2007, 199-211.

[10] R. KONING, *Sport and Measurement of Competition*, in *De Economist*, 157, no. 2, 2009, 229-249.

[11] S. ROTTENBERG, *The Baseball Players' Labor Market*, in *J. Political Economy*, vol. 64, 1956, 242-258, see p. 242.

[12] L. REBEGGIANI, D.TONDANI, *Efficienza ed equilibrio competitivo nell'organizzazione del ciclismo professionistico internazionale*, in *Riv. Dir. Ec. Sport*, vol. II, no. 3, 2006, 101-122.

[13] F. PALOMINO, L. RIGOTTI, *The Sport League Dilemma: Competitive Balance versus Incentives to Win*. http://faculty.fuqua.duke.edu/~rigotti/bio/lea0502.pdf, 2000. See also M. EL HODIRI, J. QUIRK, *An Economic Model of a Professional Sport League*, in *J. Political Economy*, vol. 79, 1971, 1302-1319; and J. QUIRK, M. EL HODIRI, *The Economic Theory of a Professional Sports League*, in R. Noll (ed), *Government and the Sports Business*, Brookings Institution, Washington (DC USA), 1974, 33-88.

is faced with a dilemma. The dilemma arises between the fact that demand for sport increases with CB and how aggressively a team strives to win (team rivalry). However monetary incentives differ in their impact on each. Revenue sharing increases CB but decreases the incentive to win, so a performance-based reward scheme may be optimal. Késenne uses a «more operational variant of the utility maximization assumption» – the win maximization (winning percentage). He demonstrates that in this case the sharing rule is effective in fostering CB and the equal distribution of talent among teams, especially after the Bosman verdict.[14] Note that the Italian sharing rule is mixed, since it gives a heavy weight to revenue sharing, but adds a small portion of performance-based scheme through point f). In what follows we present potential reasons to try to widen this portion.

Fort and Quirk provide an overview of the main structural issues concerning the impact of league cross-subsidization on CB.[15] They compare the championship formula (only regular season) to the playoff system (regular season plus playoffs), in their effectiveness when trying to convey the idea that only one team is a success. They also show the non-linear effects of the reserve clause and the draft system on revenues, being justified on the grounds that they induce more balance, but have the effect of reinforcing the monopsonist nature of the league in acquiring talent. Larsen *et al*. present an analysis on the National Football League in the USA and use the Herfindahl index to show the impact of salary caps on CB.[16] Indeed, the impact of CB on revenue sharing is complex and might induce perverse effects, as also shown by Vrooman, who concludes that «revenue sharing, in equilibrium, will effectively increase the exploitation of players, *but it will not affect competitive balance*».[17]

Another strand of the literature focuses on the definition of CB. Goossens presents an extensive overview and completes it with estimations on seasonal CB on eleven soccer leagues.[18] Overviews by Sanderson and Sigfried, and by Fort point out the theoretical difficulties.[19] Humphreys, and Utt and Fort present alternative measures of CB and their pitfalls, they use the standard deviation and the Gini coefficient of team win percentages.[20] Groot shows how a surprise

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[14] S. Késenne, *Competitive Balance in Team Sports and the Impact of Revenue Sharing: A Survey of the Economic Theory*, University of Antwerp, Research Paper 2005-019, August 2005.

[15] R. Fort, J. Quirk, *Cross-subsidization, Incentives, and Outcomes in Professional Team Sports Leagues*, in *J. Ec. Lit.*, vol. XXXIII, vol. 3, 1995, 1265-1299.

[16] A. Larsen, A. J. Fenn, E. L. Spenner, *The Impact of Free Agency and the Salary Cap on Competitive Balance of the National Football League*, in *J. Sport Economics*, vol. 7, no. 4, 2006, 374-390.

[17] J. Vrooman, *The Economics of American Sports Leagues*, in Scottish J. Political Economy, vol. 47, no. 4, 2000, 364-398; see p. 373.

[18] K. Goossens, *Competitive Balance in European Football: Comparison by Adapting Measures: National Measure of Seasonal Imbalance and Top 3*, in *Riv. Dir. Ec. Sport*, vol. II, no. 2, 2006, 77-122.

[19] A. R. Sanderson, J.J. Sigfried, *Thinking About Competitive Balance*, in *J. Sports Economics*, vol. 4, no. 4, 2003, 255-279; R. Fort, *Thinking (Some More) About Competitive Balance*, in *J. Sports Economics*, vol. 4, no. 4, 2003, 280-283.

[20] B. Humphreys, *Alternative Measures of Competitive Balance in Sports Leagues*, in *J. Sports Economics*, vol. 3, no. 2, 2002, 133-148. J. Utt, R. Fort, *Pitfalls to Measuring Competitive Balance*

index can be an instrument to avoid commercialisation of European soccer.[21] The Big-Five European soccer leagues (English Premier League, French *French Ligue*, German *Bundesliga*, Italian *Serie A*, Spanish *Premiera Liga*) offer the ground to compare several measures of CB.[22]

Even though the issue concerning the most appropriate statistical measure of competitive balance remains open, there is at least one discernible pattern in the measures used. As pointed out at the beginning of the paper, there are three levels in CB. Sloane distinguishes between short-run uncertainty within the season, and long-run uncertainty, which refers to the extent of domination over time of one group of teams over the others.[23] Caruso and Verri distinguish within-championship and between-championship indicators of CB.[24] According to Szymanski and Zimbalist the measures can be categorized into «within-season» and «between season».[25] Kringstad and Gerrard propose a more systematic approach to the definition and measurement of competitive balance.[26] They identify three dimensions: win dispersion, performance persistence, and prize concentration. The first of these concerns only the distribution of wins among league teams, whereas the other two categories refer to win-loss records and prize distribution across seasons.

We propose two measures based on the renowned Herfindahl index (*HI*) that share many characteristics with those mentioned above. Our paper adds to the existing literature with a preliminary investigation to evaluate the sharing rule adopted by *Lega Calcio* on the impulse of the law.

3. *The database*

Our dataset is original and derived from two sources of soccer history.[27] We

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with Gini Coefficients, in *J. Sports Economics*, vol. 2, no. 2, 2002, 255-279.

[21] L. Groot, *L'equilibrio del campionato di calcio di serie A*, in *Statistica*, vol. 63, no. 3, 2003, 561-577, and *De-commercializzare il calcio europeo e salvaguardarne l'equilibrio competitivo: una proposta welfarista*, in *Riv. Dir. Ec. Sport*, vol. I, no. 2, 2005, 63-91.

[22] Halicioglu uses the coefficient of variation to tests the effect of alternative point systems on CB in the Big-Five, see F. Halicioglu, *The Impact of Football Point System on the Competitive Balance: Evidence from some European Football Leagues*, in *Riv. Dir. Ec. Sport*, vol. II, no. 2, 2006, 67-76. Michie and Oughton compare several indexes on an extended time span, see J. Michie, C. Oughton, *Competitive Balance in Football: Trends and Effects*. Football Birkbeck, University of London (UK), Governance Research Centre, Research paper no. 2, 2004. See Groot and Groot for an analysis of the French league: J. Groot, L. Groot, *The Competitive Balance of French Football*: 1945-2002, in *Économie Appliquée*, vol. LVI, no. 4, 2003, 91-113.

[23] P. J. Sloane, *The Economics of Professional Football: The Football Club as a Utility Maximizer*, in *Scottish Journal of Political Economy*, vol. 17, 1971, 121-45.

[24] R. Caruso, I. Verri, *Competitive balance dopo la sentenza Bosman: il caso della pallavolo in Italia*, 2009, cit.

[25] S. Szymanski, A. Zimbalist, *National Pastime. How Americans Play Baseball and the Rest of the World Plays Soccer*, Brookings Institutions Press, Washington (DC USA), 2005.

[26] M. Kringstad, B.Gerrard, *Beyond Competitive Balance*, working paper, 2006.

[27] For the period 1929-1946 see E. Zucconi, G. Franzo, *L'età d'oro del pallone. Il calcio in Italia*

developed seasonal and historical CB indexes in professional soccer by analysing 77 seasons (1929-30 to 2008-09) of the Italian *Serie A* played in a championship formula (a round robin tournament under a national conference), therefore excluding the season 1945-46 which was played with the playoffs system (two conferences and a final round).

Historical CB (*H*) is based on the cumulated rankings at the end of each season, after adding the position obtained this season to the preceding one. *H* represents the innovative drift in *Serie A*, the underlying regeneration in the championship, as far as changes in club aristocracy are concerned. Borrowing from Vilfredo Pareto, *H* captures the circulation of team elites. In our sample 60 clubs have participated in the 77 *Serie A* seasons, representing more than half of the regions that subdivide Italy. In a league sport *H* is justified on the ground that players, fans, and investors are attracted to a team by its legacy. Tradition is relevant in attracting people whose local team is not in *Serie A*; these people end up supporting a bigger team endowed with relevant historical streak of victories. *H* could also be used as a proxy for the differences in market size, which Késenne deems the most important factor that affects CB in a league.[28]

The data which form the base for the index were calculated as follows. The winning club in a 16-club tournament gains 16+5 points, the team second in position gains 15 points, and so on. This is a slight modification of the widely-adopted British system, according to which the winner gets 16 points, the second 15, and so on. The rationale to add five extra points is to reward for the incremental effort necessary to win the season. Further, the extra points correct the declining effect in the points growth rate from lower to higher positions. For example, since (16-15)/15<(15-14)/14, the growth rate does not reflect the extra effort in obtaining first place. In essence, the productivity necessary to win the championship is depicted as marginally declining once moving to the top level, so we wanted somehow to correct for this effect. Whereas ending third or second might require almost the same effort, there is a large gap between first and second place, so this difference must be accordingly compensated and accounted for.

Seasonal CB (*S*) is calculated on the basis of the points obtained. The underlying concept is that when the gap between teams, as measured by points, is narrow, there is a more balanced season; the larger is the gap the more unbalanced the season is.

For either index, a higher value indicates lower competitive balance; loosely speaking, the rule is «the less, the better». So, if a group of clubs historically dominates the others, *H* is high; if the season was unbalanced, because certain clubs always win, *S* is high.

A natural transmission mechanism exists between *S* and *H*, because winning

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dalle origini al 1950, Novantico Editrice, Pinerolo (Torino Italy), 2006. From 1946 on, see M. CORTE (ed.), *Calcio 2007*, Reality Book, Rome (Italy), 2006.

[28] S. KÉSENNE, *Competitive Balance in Team Sports and the Impact of Revenue Sharing: A Survey of the Economic Theory*, 2005, cit.

more matches and more direct matches turns into scoring more and hence a higher final place. We leave the measurement of the consistency of this relationship to another paper that will apply vector autoregression. Presently, we notice that in its barest form there is a connection at work, however feeble, between a club winning a game and their historical performance. Consider three teams (A, B, C) that obtain the same points and end up in middle rank (8th place). The final ranking allows only one team per spot, so there must be a rule to establish that A is 8th, B is 9th, and C is 10th. There are several criteria to establish what the final rank might be, for instance, the difference between goals scored and received, or direct matches. We adopt whichever criterion underlies the official source. While ranking 8th or 9th can be just for the record or for the team prestige, the impact might be important in other cases, for example when qualification for the European Cup is at stake, or when relegation threatens.

The problems in the calculation of the variables arose from the fact that many seasons have been plagued by team misconducts, which have induced *Lega Calcio* to sanction the clubs. Keeping in mind that seasonal CB is aimed at fostering a more exciting experience for the fan, we should therefore prefer the actual result to the one established by *Lega Calcio*. However, it is not always possible to reconstruct the true situation before the sanctions, so as a general rule and to avoid measurement errors that we might inadvertently introduce in the data we will stick to the official records as much as possible. This is applied for the 2-points system and the 3-points system.

The most relevant exception to this rule is season 2005-06, which made history in Italian soccer. The winner, Juventus, ended the regular season at 97 points, but the club was later relegated to *Serie B*: the 97 points were cancelled and the title taken away and given to Inter. This was such an exceptional season that we decided to use effective results, both in points and rank.

We distinguish two types of sanctions: (1) changes in points, and (2) abrupt movements in the ranking. The change in points can be imposed «backwards» or «forwards» (but mixed cases are also possible). In the former the sanction immediately affects the just-ended season s, in which the misconduct occurred, therefore the official final points and ranking differ from actual results. In the latter the sanctioned club starts at below zero in season $s+1$. When points are taken away in the subsequent season we do not modify anything in that year; for example, sanctions inflicted for misconduct in season 2005-06 caused many clubs to start season 2006-07 with a negative amount of points. We took the points as they were at the end of the final official ranking at the end of season 2006-07; this means that in calculating S we did not add back the points that were taken away, and the ranking used to calculate H is the official one. In these cases the points gained on field differ from the number reported in the official ranking; therefore in many seasons the total of points available (for example, in season 1973-74: 480 points for 16 teams) are more than the actual points won by the teams (477 in that season). We do not correct the upper and lower bound in the Herfindahl indexes in these occurrences (see Sect. 4).

Our decision to remain loyal to the official records has a beneficial side-effect, because when the sanction is of the forwards type, we *de facto* follow on-field results in calculating *S*, which can be considered the real output of the season. Indeed, if only the gap between teams matters, it is not so interesting to know what the starting points for each team were. If a team starts below zero and wins the title by one point only, the fans will have enjoyed both a more balanced season and an exceptional winning streak. If we calculated the coefficient of variation for that season, and added back the penalized points, we would not appropriately measure seasonal CB, because the final gap between teams would become larger, thus distorting the measurement of CB as perceived by the fans. Therefore, in the forwards penalization cases we decided to consider the official ranking without adding the penalization points that had been taken away, since the true output of that season had already taken into account any penalization and was known by everybody.

Consider now the backwards penalization cases. The season the fans actually watched produced a final ranking which differs from the official one due to the correction made by the League and provoked by a team's misconduct that was unknown to fans during that season. If we followed the same criterion as in the forwards cases, we should re-establish the real situation by adding the penalization points that the League subtracted from the team at the end of the season, despite the misconduct of the club. However, in the backwards case we did not add the penalization points back because (1) our intervention might induce a measurement error to the reported official output of the season; (2) the season had already ended, and the fans enjoyed that CB as if it were real, even though the results had been manipulated. Consider *H*, which measures the strengths of a club according to the history in terms of final positions. Here official statistics matter, and the position in the official ranking after any penalizations inflicted by the soccer League. Our choice is justified from the perspective of the historian who looks at the official records when calculating *H*, because the historical record transmit only official results in the future, when the next generation will be fascinated by the historical record of a team and the final ranking. Season 2005-06 is an exception, and another is represented by season 1947-48, in which Napoli had gained 34 points, and had earned third-to-last place, but was *ex-officio* moved to last place. We maintained Napoli at the third-to-last place to be consistent with *S* in that season, because the reported points are those the club had before the change in position.

As far as abrupt movements are concerned, they change the final ranking with effects on the following season; for example in 1954-55 Udinese and Catania finished second (44 points) and twelfth (30 points) respectively, but were relegated. The official records in the books left things as they were at the end of season, both in ranking and in points, and we calculated *S* and *H* accordingly. Needless to say, those teams are absent from season 1955-56, so the effect is transferred to season $s+1$.

4. *Two Herfindahl indexes to measure competitive balance*

In this section we present two Herfindahl indexes, normalized in the interval [0,1]. The *HI* has been extensively analysed in statistics and widely used in industrial economics as a measure of market power in industry.[29] We have:

$$HI = \frac{\sum_{i=1}^{N} x_i^2}{\left(\sum_{i=1}^{N} x_i\right)^2} = \frac{\left(CV^2 + 1\right)}{N} \tag{1}$$

where N is the number of clubs in the season and x_i is the transferable quantity under analysis between clubs, i. The second equality shows the relationship between *HI* and the coefficient of variation *CV* (the ratio between the standard deviation and the mean), useful to recall since *CV* is sometimes considered an alternative to *HI*. *CV* and *HI* are independent of the unit of measurement and are helpful in comparing the variability of a phenomenon under different circumstances.

HI lies in the interval $[HI_L, HI_U]$. The lower bound HI_L indicates the occurrence of equal distribution of the x's among the individuals, $HI_L=1/N$, while the upper bound $HI_U=1$ represents the situation when one individual owns the whole quantity at stake. Even though these are unreasonable extremes, they are conventionally considered the lower and upper bounds. Michie and Oughton point out that the lower and an upper bounds vary according to N, the number of clubs in a season (in the league).[30] They focus on seasonal CB only, and also present a standardized index called the Herfindahl Index of Competitive Balance.

Our indexes do not need be standardized since the normalization has the same effect, as far as comparing indexes across seasons with different league size N. Our normalization is an improvement in showing how the lower and upper bound varies across indexes in an unified framework, ready for applications in a time series analysis such as vector autoregression, wherein a system would empirically test of the complex interactions which obscure a clear vision on the league size, the sharing rule, the talent employed, and competitive balance. The novelty to the literature is twofold. Indeed, not only does normalization make direct comparison across seasons feasible, but it also allows us to use both seasonal and historical CB, useful for the purpose of this paper for comparingthe relative roles of S and H under the sharing rule.

The Normalized Herfindahl Index (*NHI*) lies in [0,1] and is obtained as follows:

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[29] In statistics, our sources were G. Leti, *Statistica descrittiva*, il Mulino, Bologna (Italy), 1983; D. Piccolo, *Statistica*, il Mulino, Bologna (Italy), 1998. As regards industrial economics, see A. P. Jacquemin, H.W. de Jong, *European Industrial Organization*, Macmillan, London (UK), 1977.

[30] J. Michie, C. Oughton, *Competitive Balance in Football: Trends and Effects*, 2004, cit.

$$NHI = \frac{(HI - HI_L)}{(HI_U - HI_L)} \tag{2}$$

Consider first *H*, the *NHI* based on the club's history in *Serie A*, the cumulative rankings. Rankings are «transferable» among clubs. To fix the theoretical bounds, we could have one club that wins all of the Championships and at the other extreme a newly-promoted club which, arriving last, is relegated at the end of season, never returns to *Serie A*. In theory, in the long-run new clubs can appear every season, hence, we consider the upper and lower bounds as corresponding to the theoretical ones, $HI_L = \frac{1}{N}$ and $HI_U = 1$; in this case the *NHI* can be easily calculated, after some tedious algebra, as follows:

$$NHI = \frac{CV^2}{(N-1)} \tag{3}$$

As far as *H* is concerned, *CV* is the coefficient of variation of the cumulative points associated with final positions obtained at end of season by teams in *Serie A*, prior to any adjustment due to disciplinary sanctions for that season, *s*; if disciplinary points are transferred to the next season *s*+1, they are taken into consideration in season *s*+1.

Now consider *S*. In a soccer match the points at stake are either 2 or 3, and whatever the point system, at least two of them are assigned. Moreover, overall available points in a championship are only transferable to a limited extent. Thus, the lower and upper bounds in the *HI* for *S* are not the same as in *H*. Consider the two extreme cases, that define the lower and upper bounds. The lower bound originates from the most balanced season, that with an equal distribution of points. In this scenario all the matches are a draw, except one, whose winner then wins the league title (whereas the loser of that match ends up last); all the remaining clubs are ranked with equal points. We calculated eight Herfindahl indexes S_L, arising from mixing the number of clubs (*N*=16,18,20,21) with the points system (2-points or 3-points). The upper bound S_U originates from the highest level achievable by *HI*. Since we do not want any balance of sorts, we exclude draws and consider games with a winner. The ranking follows matches won: the title-winner of a *N*-clubs league wins all the 2(*N*–1) games, the second in ranking wins two matches less, and so forth in descending order; some clubs remain at zero points. We calculated the index of maximum concentration of points on the basis of the wins, for the cases in which *N*=16,18,20,21 (now the 2-points and the 3-points system do not differ). We normalized the Herfindahl index for *S* as follows:

$$S = \frac{(HI - S_{LN})}{(S_{UN} - S_{LN})} \tag{4}$$

for N=16,18,20,21. The transferable quantity is points, either for the 2-point or the 3-point system, as reported in the official sources (excepting season 2005-06).

Now the effects of the normalization will be illustrated to show the usefulness of the procedure. Consider S before the normalization, S_{non} (it is HI in eq. (4)). Fig. 1 shows how far S_{non} is from the upper and lower bounds. In Fig. 1 we draw the upper and lower bounds according to the number of clubs per season, calculated for the 2-point system. The upper bound is not changed by the 3-point system, whereas the lower bound is slightly modified.

FIGURE 1. LOWER AND UPPER BOUNDS FOR SEASONAL COMPETITIVE BALANCE BEFORE NORMALIZATION

S_{non} is S before the normalization and is compared to the upper and lower bounds. The variable shifts downwards when the number of clubs in the season increases.

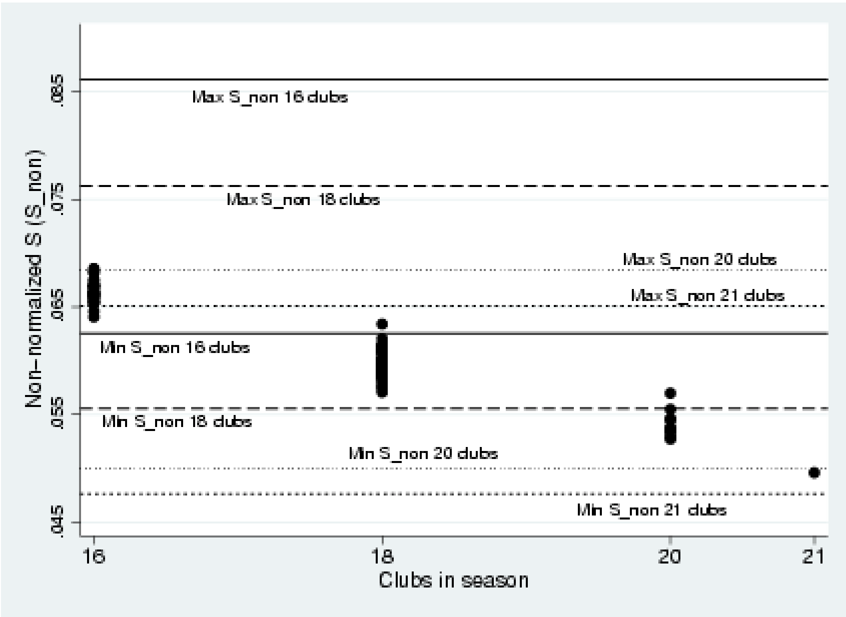
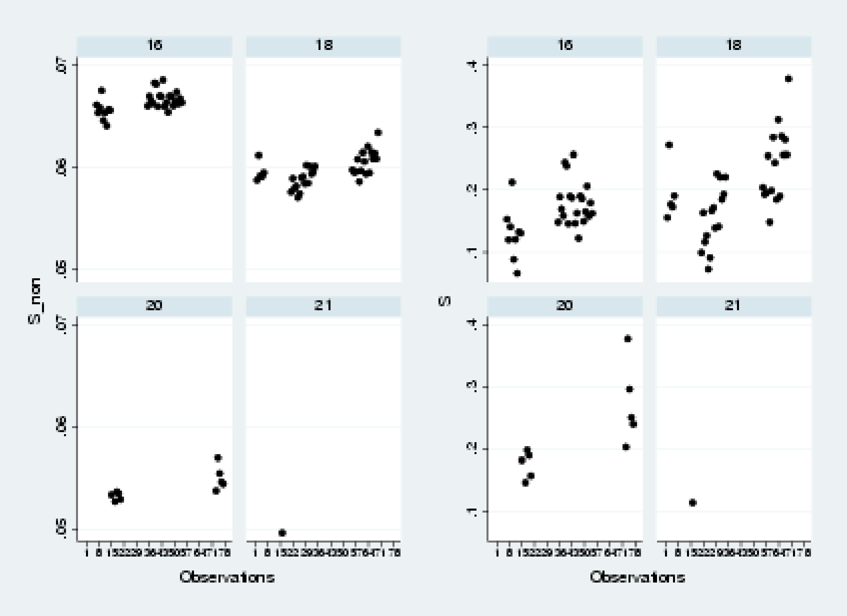


Fig. 2 offers a visual inspection of the usefulness of the normalization. On the left side of the figure, if we group S_{non} according to the number of clubs, we see that it shifts downward when the number of clubs increases. On the right side of the figure, S displays no discernible pattern when grouped by the number of clubs in the season. Note that the index is always on the bottom part of the interval, which is a good sign of high CB.

FIGURE 2. COMPARISON BETWEEN S AND S_{non}, GROUPED BY NUMBER OF CLUBS IN THE SEASON

The figure shows that S after the normalization does not depend on the number of clubs anymore



Some descriptive analysis on the two indexes for the Italian Championships will now be presented. Consider the 77 observations in cross-section, as if they stand in front of us *today*. The summary statistics of the two main variables are reported in Tab.1, together with the Jarque-Bera normality test, which is based on the skewness and the kurtosis of the distribution and has the null hypothesis of

TABLE 1. SUMMARY STATISTICS OF THE VARIABLES

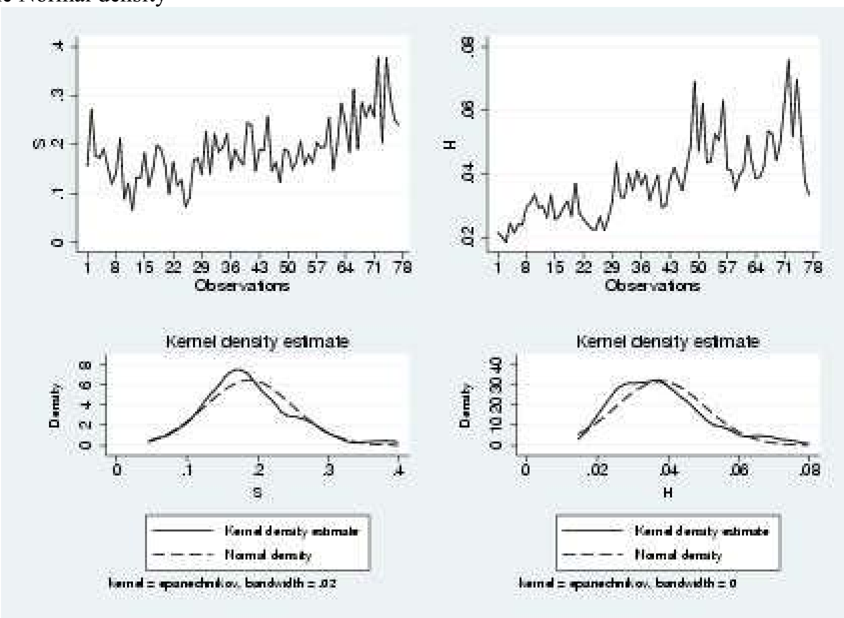
The null hypothesis of the Jarque-Bera (1980) test is that the distribution of the series is Normal

Variable	Description	Mean	Median	Max Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera (p-value)
H (Historical)	Normalized Herfindhal index, on final ranking	.03787	.03661	.07576 .01850	.01250	0.88	3.50	10.718 (.005)
S (Seasonal)	Normalized Herfindhal index, on points	.18772	.18480	.37852 .06593	.06164	0.77	3.96	10.517 (.005)
H0809	Cumulated rankings, after season 0809	213.8	68	1316 1	323.5	2	6.08	63.95 (.000)

normality.[31] The test rejects the null hypothesis that *H* and *S* have a normal distribution. (The variable *H0809* is cumulated rankings at the end of season 08-09 and will play a major role in subsequent sections.)

The two series are compared in Fig. 3. On the top part of the figure we depict the evolution of *S* and *H*. Notice that *H* is always very low, which means that for the clubs participating at the season the inequality is not as important. *H* shows a increasing trend over time, whereas *S* alternates between periods of a declining trend and periods of an increasing trend. We leave investigation of the paths to further analysis.[32] What is more relevant for the purpose of the current work is that *S* is tenfold *H*, implying that the season is more unbalanced when compared to the history. In the lower part we show the two kernel density estimates of the distributions, using the Epanechnikov kernel approximation to the Normal density for immediate comparison with the Normal distribution, which is superimposed in each graph.

FIGURE 3. *H* AND *S*: TIME SERIES AND KERNEL DENSITY ESTIMATE
Top panel: Time series. Bottom panel: Kernel density is Epanechnikov approximation to the Normal density



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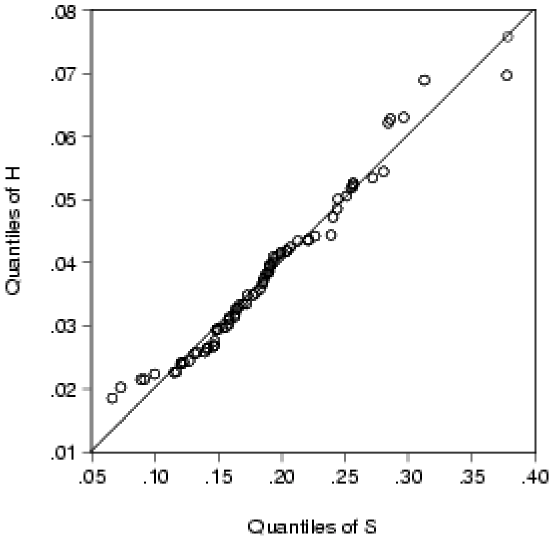
[31] C.M. JARQUE, A.K. BERA, *Efficient Tests for Normality, Heteroskedasticity, and Serial Independence of Regression Residuals*, in *Economics Letters*, 6, 1980, 255-9.
[32] See K. GOOSSENS, *Competitive Balance in European Football: Comparison by Adapting Measures: National Measure of Seasonal Imbalance and Top 3*, 2006, cit., for an analysis along these lines.

The quantile-quantile plot in Fig. 4 shows that the two distributions are quite similar in shape; the axis represents ordered values of the variable.

FIGURE 4. QUANTILE-QUANTILE PLOT OF *S* AND *H*

Values on the axis represent ordered values of the variables. The two variables present similar distributions



We have polished *S* from any mechanical tie to the number of clubs, and the two indexes lie on the same interval, so the connection between seasonal and historical CB can be seen by investigating *S* and *H* together. Consider then *H* and *S* as if they were some kind of transferable benefit, like money. If CB were money, then each season/league has an income of *S* and a wealth of *H*, so *H*+*S* is a sort of year-by-year endowment belonging to the league, *Serie A*. Since the two variables run in the same direction (the more *H*, or the more *S*, the more the inequality), we can apply tools from the studies on inequality, such us the Gini index and its decomposition by source, wherein the transferable variable is *H*+*S*; see Tab. 2.

Lerman and Yitzhaki decompose the Gini coefficient *G* as follows: $G=\Sigma_k \cdot R_k \cdot G_k \cdot S_k$, where *k* is the income source (*H* or *S*), R_k is the Gini correlation of income from source *k* with total income, G_k is the relative Gini of component *k*, S_k is the component *k*'s share of total income.[33] Lopez-Feldman decompose «the

[33] R.I. LERMAN, S. YITZHAKI, *Income Inequality Effects by Income Source: A New Approach and Applications to the United States*, in *Review of Economics and Statistics*, vol. 67, 1985, 151-156, especially p. 152.

Gini coefficient by income source using the approach described in Lerman and Yitzhaki (1985) and Stark, Taylor and Yitzhaki (1986), which allows calculation of the impact that a marginal change in a particular income source will have on inequality. The last column of the table of results (% Change) refers to the impact that a 1% change in the respective income source will have on inequality.».[34]

TABLE 2. GINI DECOMPOSITION BY SOURCE: TOTAL TRANSFERABLE VARIABLE IS *H+S*
Lerman and Yitzhaki (1985: 152) decompose the Gini coefficient G as follows: $G=\sum_k \cdot R_k \cdot G_k \cdot S_k$, where k is the income source (H or S), R_k is the Gini correlation of income from source k with total income, G_k is the relative Gini of component k, S_k is the component k's share of total income. % Change refers to the impact that a 1% change in the respective income source will have on inequality

Source	S_k	G_k	R_k	Share	%Change
S	0.8321	0.1781	0.9868	0.885	0.0529
H	0.1679	0.1803	0.6276	0.115	-0.0529
Total “income”		0.1653			

In analysing these results, recall that we are comparing 77 leagues, which are the individuals. The source Gini G_k shows the inequality across leagues. The two variables do not differ, S is .178 and H is .18. The Gini correlation from source S with total is 99%, whereas for H it is 63%, which already points at a difference. Seasonal inequality accounts for 88.5% of total inequality, which closely follows the share in total value (83.2%), and which points at a substantial difference. A 1% change in S will have a positive effect of 5% on inequality, opposite to that generated by an equivalent change in H. This change is calculated in a cross-section, therefore a more meaningful measurement is through an impulse-response function, which better explains the dynamic effects of one variable on the other. However, from a static point of view, these results show the relative relevance of S as opposed to H in influencing the fans’ perception of CB. Indeed, seasonal CB is what fans deem most relevant, and therefore more relevant for clubs to increase their fan-base, since: (1) older fans have already made a choice concerning their favourite club and will not switch for any reason; (2) young people who start watching soccer are more attracted to the season’s winning club, and are less concerned about the club’s history. Thus, the problem of historical CB is not so

[33] R.I. LERMAN, S. YITZHAKI, *Income Inequality Effects by Income Source: A New Approach and Applications to the United States*, in *Review of Economics and Statistics*, vol. 67, 1985, 151-156, especially p. 152.
[34] A. LOPEZ-FELDMAN, *Decomposing inequality and obtaining marginal effects*, in *The Stata Journal*, vol. 6, no. 1, 2006, 106-111, R.I. LERMAN, S. YITZHAKI, *Income inequality effects by income source: A new approach and applications to the United States*, in *Review of Economics and Statistics*, vol. 67, 1985, 151-156. O. STARK, J.E. TAYLOR, S. YITZHAKI, *Remittances and inequality*, in *Economic Journal*, vol. 96, 1986, 722-740.

relevant when compared to seasonal CB. In the following section we assess the relevance of historical CB.

5. *A self-reinforcing mechanism?*

Sixty clubs have appeared in *Serie A* in our sample period (this group represents the elite of Italian soccer) and only twelve clubs have won the title (three of them won just once and nine at least twice). In calculating *H* we applied the theoretical upper and lower bounds on the grounds that clubs can disappear and be substituted by others in the long-run. This has indeed happened, since several clubs have disappeared not only from *Serie A* but also from minor leagues. Others have lost their strength in the long run, the most notable example being Genoa, having won nine titles, all of them before 1929. Other clubs, once eminent, have not won a title for decades.

Surely, one of the most relevant worries for the league is that a self-reinforcing mechanism might set in, according to which a certain few clubs will go on either winning or ranking high, whereas the others will go on ranking poorly. This self-reinforcing mechanism is just another facet of historical competitive unbalance, but could not be seen from the results presented in Section 4. We want to investigate now the extent of such a mechanism, namely, how elitism circulates in *Serie A*, so we focus on clubs. To this end, consider the cumulated rankings of each club *today*, at the end of season 2008-09 (the last observation in the sample). Which club has ranked most consistently? It is interesting to know how the cumulated positions are distributed among the clubs, so we sum the rankings obtained by each club from season 1929-30 to the end of season 2008-09 and define this variable *H0809*.[35] The descriptive statistics are reported in Tab. 1.

We find out that Juventus ranks first with 1316 cumulated rankings (in our calculations Juventus is still first in 2005-06), Inter is second with 1195, Milan third with 1175, Roma fourth with 882, and so forth, the last two positions are gained by Treviso and Pistoia with 1, put in that order at random (which means, not even in alphabetical order). In Fig. 5 we report the scatter of the 60 observations in the sample; note that only three clubs are well above 1000, that only 7 teams are between 500 and 1000, and all the rest (5/6 of the sample) is under 500. A well-established hierarchy in Italian soccer is already apparent from this: there are 3 clubs that dominate, and 7 clubs which fiercely compete with those at the very top. Recall that in the calculation of *H* we have added 5 points to the winner of the season, so that the club obtains 20+5 instead of 20; the results do not change dramatically if we take the extra 5 points off.

For each season *H* implies a corresponding Lorenz curve that displays the inequality in the history of clubs participating in the season. Fig. 6 shows the Lorenz curve for *Serie A* based on *H0809*. It represents the effect of the turnover

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[35] This variable is not *H* at 2008-09, even though the numbers are used to calculate the 2008-09 observation of *H*.

in elite teams today. Observe that 90% of the clubs detain 50% of cumulated total positions available in the whole history of Italian soccer; the total Gini index is 0.668, which shows not only ample inequality but is also in sharp contrast with the historical record of the Herfindahl index of *H*, reported in Tab. 2, which is G_k=0.18 and pertains to the league. This is a strong evidence of the long-term tendency of the aristocracy to reinforce.

Historical CB might be relevant in itself. By estimating a Pareto distribution in the data, we can show the presence of the self-reinforcing mechanism and underline some characteristics that sport as entertainment shares with the movie industry.[36] The parameter of interest is the tail weight a, which is a measure of probability weight in the upper and lower tails of the distribution, and a measure of inequality: «Small values of a are associated with large inequality because such values make extremely large grosses more likely»;[37] a lies in (0, 2], a=2 in the Normal distribution; if a<1 the mean can be infinite.

According to Pareto, the percentage of people with an income of *u* follows a power law: $P(u)=(u/m)^{-a}$.[38]

In the formula *u* is compared to the amount *m*, taken as a reference point; for instance *u* is ten times *m*. The law can be read as the probability of finding a group of income earners with that income *u*. We estimate a=1/b in the following Pareto regression (an ordinary least squares on the 60 observations):

$$\log(H0809)=\log(const)-b*\log(RANK) \tag{5}$$

where log(*H0809*) is the natural logarithm of *H0809*, *const* is the intercept, and log(*RANK*) is the logarithm of the position that each club has in this special 'overall-Championship' (Juventus's rank is 1, Pistoia's is 60). The Pareto-distribution tail weight of *H0809* is $a=\frac{1}{1.658}=.6$. The measure of inequality a (small values are associated with large inequality) is derived from the following estimates (standard errors in parenthesis):

$$\log(H0809)=\underset{(.395)}{9.46}-\underset{(.121)}{1.658}*LOG(RANK) \tag{6}$$

Adjusted-R^2 = 0.761, obs.=60; F(1, 58)=188 (Prob > F=0.0000)

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[36] For the movie industry, see A.S. De Vany, *The Movies*, in V.A. Ginsburgh, D.Throsby (eds.), *The Handbook of the Economics of Art and Culture, Volume I*, Elsevier, Amsterdam (Holland), Chapter 19, 2006, 615-665.

[37] A.S. De Vany, *The Movies*, 2006, cit., 641.

[38] B.B. Mandelbrot, R.L. Hudson, *The (mis)behavior of markets. A fractal view of risk, ruin, and reward*, Basic Books, New York (NY USA), 2004; see chapter 8, note 4. In his investigations on income Pareto calculated that a=1.5.

FIGURE 5. *H0809* AND *Serie A* CLUBS

H0809 on the vertical axis is cumulated rankings by a club from season 1929-30 to season 2008-09

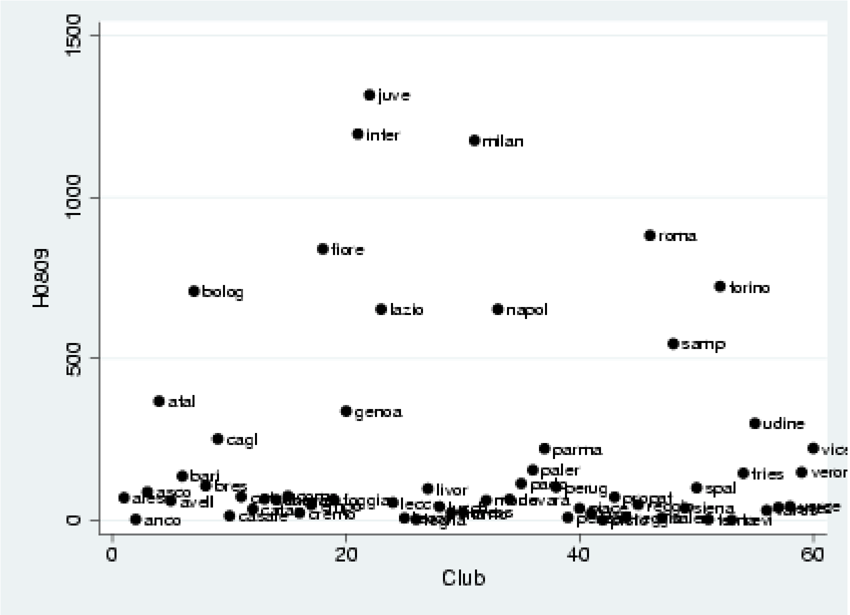
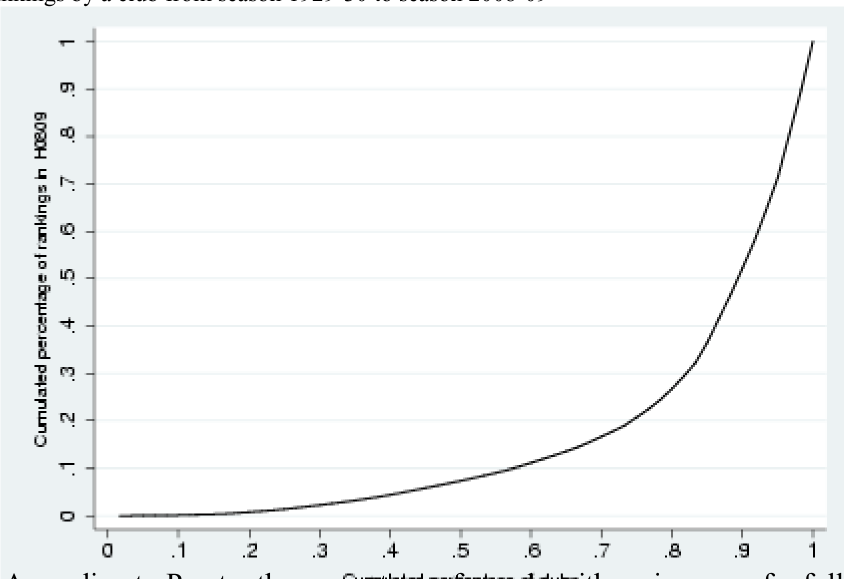


FIGURE 6. LORENZ CURVE FOR *Serie A* DERIVED AFTER *H0809*

Horizontal axis is the cumulated percentage of 60 clubs ordered according to final rankings as in *H0809*. Vertical axis is the cumulated percentage of *H0809*. *H0809* is the cumulated rankings by a club from season 1929-30 to season 2008-09

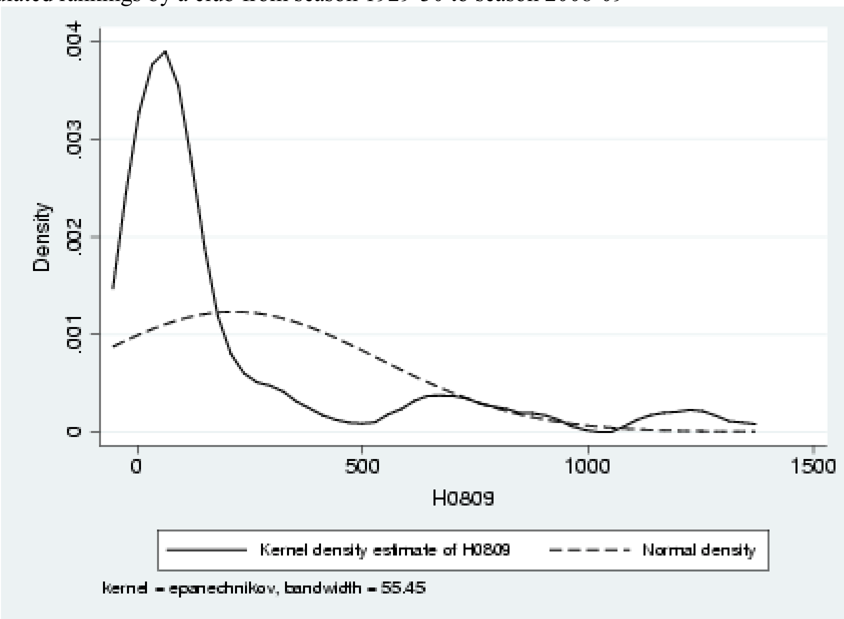


According to Pareto, the percentage of people with an income of u follows a power law: $P(u)=(u/m)^{-a}$.[38] In the formula u is compared to the amount m, taken as a reference point; for instance u is ten times m. The law can be read as the probability of finding a group of income earners with that income u.

This regression shows that the inequality is very strong among clubs and that it is the result of a long-term, consistent, historical record, which builds up a self-reinforcing mechanism. De Vany uses the same regression, putting revenues on the left hand side to show the «winner takes all» law of the motion picture box office, which he calls the «Hollywood kurtocracy».[39] As he puts it: «One of the best measures of inequality is the kurtosis. This is a measure of departure from the shape of the Gaussian distribution. A leptokurtotic distribution is sharply peaked, asymmetric and skewed».[40] Indeed, these characteristics pertain to the distribution of *H0809* as shown by Fig. 7; it is a skewed distribution with a long right tail.

FIGURE 7. KERNEL DENSITY ESTIMATE OF H0809

Kernel density is the Epanechnikov approximation to the Normal density. *H0809* is the cumulated rankings by a club from season 1929-30 to season 2008-09



Is this a dismaying picture? It depends on the perspective.

On the one side, from an historical perspective, the picture gets dark. There are at least two dozens of clubs that have always played in the second division *Serie B* without ever falling to *Serie A* (and even more, if we counted clubs in *Serie C* and beyond). Why this *Serie A* aristocracy? It is plausible to suppose that the origins of the aristocracy lie in exogenous, non-sport factors, such as the economic environment (market size, availability of investors who spend money on clubs).

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[39] A.S. DE VANY, *The Movies*, 2006, cit.

[40] A.S. DE VANY, *The Movies*, 2006, cit., 641.

On the other side, from a different point of view, note that ten clubs have collected the most relevant positions, and these teams will almost surely be always present in *Serie A*. This implies that half of the 20 clubs which now take part in the league are strong competitors, therefore a thrilling season is guaranteed. This is shown by *S*, which always remains on the lower end of the range (see Section 4, especially Fig. 2). Why bother with the clubs' history, then? As said, it impacts on the sharing rule, otherwise *H* would be irrelevant. Given that a self-reinforcing mechanism is working, one can ask whether the sharing rule tries to hamper this mechanism.

We sustained that *H* measures the innovative drift underlying *Serie A*, regulated by the turnover among relegated and promoted clubs. Presently, a dilemma is established: more seasonal CB might be fostered by reducing the number of clubs (with 16 clubs it will be more balanced), but this is in sharp contrast with the desire to let more clubs into the *Serie A*. Moreover, recall that the number of clubs in the league has an impact on the relative convenience of the centralized versus the decentralized system of selling television rights.[41] The complex effects call for a more extensive empirical research, to which our *S* and *H* will be useful. In the meantime, in the next section the impact from newly-promoted clubs on elite formation is investigated.[42]

6. *The innovative push from newly-promoted clubs*

In this section we answer a modified version of the following question, which was suggested by an anonymous referee: What is the probability that a promoted team could break the aristocracy? The referee pointed out that in order to check if a downward trend appears, which would support the opinion that the self-reinforcing mechanism emerges from the distance between the divisions' quality, «One possibility is to measure the share of points (wins) achieved by the promoted teams from Serie B». Indeed, newly-promoted clubs should represent the innovative push that hampers the self-reinforcing mechanism. Is this so?

The variable *POINTS%PROMOTED* reports the share of points gained by new clubs in the season (mean is .1358, maximum is .26, standard deviation is .0424). The time trend is denoted by *t*. *FIRSTAPPEAR* counts the number of clubs that make a first appearance in that season (mean .5, maximum 3). *PROMOTED* indicates the number of new clubs in the season (median value 3, maximum 6). *CLUBS* counts the number of clubs in the season (minimum16, median 18, maximum 21, mean 17.5). *D3POINTS* is a dummy for the 3-points system. Eq. (7) reports

[41] For a theoretical analysis see S. Falconieri, F. Palomino, J. Sakovics, *Collective versus individual sale of television rights in league sports,* in *Journal of the European Economic Association*, vol. 5, no. 2, 2004, 833-862; Italian translation: S. Falconieri, F. Palomino, J. Sakovics, *La vendita dei diritti televisivi nel calcio,* in *Riv. Dir. Ec. Sport*, vol. I, no. 3, 2005, 67-88.

[42] We are grateful to an anonymous referee, whose suggestion led us to add the following section. We think it improves the paper a lot. As far as the referee's responsibility is concerned, the usual disclaimer applies.

the ordinary least squares regression to explain *POINTS%PROMOTED*, using Newey-West heteroskedasticity- and autocorrelated-consistent standard errors and covariance, with lag truncation at three.[43] Standard errors are in parenthesis, significance level under 1% is marked by ***, lack of asterisks means non-significant coefficients.

$$\begin{aligned} POINTS\%PROMOTED = &\underset{(.0191)}{0.777^{***}} - \underset{(.0001)}{7.8*10^{-5}*t} - \underset{(.0028)}{.0021*FIRSTAPPEAR} + \underset{(.0026)}{.0450*PROMOTED^{***}} \\ &- \underset{(.0011)}{.0039*CLUBS^{***}} - \underset{(.0067)}{.0011*D3POINTS} \end{aligned} \qquad (7)$$

Adjusted-R^2=0.864, obs.=77; F(6,71)=97.2 (Prob>F=0.0000).
Standard error of the regression = .0157.

The regression shows that the time trend and the three points system are not significant in fostering innovation. The number of clubs that appear for the first time in the season is not significant in increasing the percentage of points earned by the newly-promoted clubs.

The significant intercept shows that new clubs earn at least 7.8% of the available points. One more promoted club augments by 4.5 the percentage of earned points. Increasing the number of clubs reduces the percentage of points gained by new clubs, for example reducing the clubs in the season by 5 will increase the percentage of points, by 2%. This allows us to distinguish the impact of the number of clubs from the innovative drive deriving from turnover. Equation (7) shows that while the latter should be improved as much as possible, the former should be reduced, so eq. (7) allows us to suggest an increase of the number of newly promoted clubs as much as possible (e.g. four promoted/relegated clubs is better than three). In a championship of sixteen, ten would belong to the aristocracy and guarantee a strongly fought season, four should exert an innovative impulse, the remaining two would also represent change.

7. *Conclusions*

As a preliminary step towards studying competitive balance (CB) on professional Italian soccer we have presented two time series for the whole Italian championship based on normalized Herfindahl indexes, one calculated on the end-of-season points (seasonal CB, *S*) and one calculated on the cumulative rankings attained by clubs (historical CB, *H*). These indexes can be used together inside models that explicitly address policy issues, such as the dilemma between competitive balance and incentives to win, as pointed at by Palomino and Rigotti.[44] A way to see through

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[43] See J.H. Stock, M.W. Watson, *Introduction to Econometrics*, Pearson, Boston (MA USA), 2007; sect. 15.4.

[44] F. Palomino, L. Rigotti, *The Sport League Dilemma: Competitive Balance versus Incentives to*

the impact of CB on other policy recommendations is to investigate the interplay between historical and seasonal CB in a vector autoregression, which we leave to further research. While waiting for further econometrics estimates that might help in policy suggestions, we are able to derive a modest proposal using our evidence so far.

We have seen that CB has ample scope, so pursuing CB per se might be a debatable aim and something on which people have diverse opinions. We do not take a stand on whether CB is good or bad per se, but our evidence suggests that seasonal CB is more relevant than historical CB. We summarize our results as follows.

First, in the long run there is an aristocracy of clubs composed of at least 4 and at most, 10 clubs, always present in the championship, which is large enough to expect that each season to be fiercely fought. Second, this aristocracy does not wipe out uncertainty in the season, since teams tend to vary a lot (needless to say, even for the same club through the years). Third, seasonal CB is always strong enough in the whole period (in the lower end of the interval of the normalized Herfindahl index *S*). Fourth, in order to increase the percentage of points gained by newly-promoted teams (thus, to reduce the weight of the aristocracy) one must increase the turnover (increase the number of promoted teams) and reduce the number of teams in the *Serie A*. Thus, CB might be more strongly fostered through a championship of 16 clubs rather than 20.

However, we have underlined two possible dilemmas. One is between the desire to foster seasonal CB and the policy of allowing more clubs to participate in the *Serie A*, besides the established aristocracy. This could be easily dealt with by increasing the number of promoted/relegated clubs to four (or at least three).

A bigger dilemma arises from the fact that reducing the number of teams (shrinking the league size) lowers the number of matches, which in turn reduces events that generate earnings, and this impacts on the sharing rule.[45] It is plausible to suppose that this should not be a big problem, as demonstrated by the fact, for instance, that some leagues (most notably, the Premier League) voluntarily reduce the amount of broadcasted matches. More empirical analysis is needed on this subject.

Policy implication from our results would be very limited when historical CB is considered, if it were not that club's history is directly addressed inside the sharing rule. Indeed, an aristocracy has emerged in the long run, from a self-reinforcing mechanism among clubs which reasonably depends on exogenous reasons, which we do not think soccer can easily get rid of. Our preliminary findings erode the usefulness of some of the criteria in the newly adopted sharing rule.

It is reasonable to suspect that the bigger weight given to historical CB in the sharing rule does not hamper the self-reinforcing mechanism. In addition the

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Win, 2000, cit.

[45] S. Falconieri, F. Palomino, J. Sakovics, *Collective versus individual sale of television rights in league sports*, 2004, cit.

bigger clubs already enjoy a larger market size, and the sharing rule acknowledges this fact. We suggest that the 15% share of revenues as caused by historical results (from 1945-46) is dispensable and this 15% can be diverted to somewhat rebalance the situation, and be added to the 5% of reward from the season results. The sharing rule adopted by *Lega Calcio* will then more closely resemble the «reward scheme» and reinforce the incentive to win. (Then, the parachute for relegated clubs would be no longer be necessary, so that relegated clubs will not have too much power in *Serie B* in the season following their appearance in *Serie A*.)

One might argue that this solution is not politically viable, since bigger clubs will threaten to form a league by themselves and *Lega Calcio* as it stands today would break apart. However, the sharing rule already reduces the bigger clubs' strength to compete at the European cups, so these clubs might have a benefit from having to play less matches at the National championship (and therefore they would focus on their European cup games). As these are tentative hypotheses, a more thorough analysis is surely needed to test the overall validity of the sharing rule.

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