

Competitive Balance and Uncertainty of Outcome Hypothesis- A Revolution in Sports Economics

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Introduction

Simon Rottenberg, an economist at the University of Chicago is widely regarded as the founder of sports economic research. The first ever professional journal article in sports economics was published by him in the year 1956 called, "The Baseball Players' Labour Market". The central theme of the paper was the concept of competitive balance in sports. In his own words:

"The nature of the [sports] industry is such that competitors must be of approximately equal "size" if any are to be successful; this seems to be a unique attribute of professional competitive sports."

Simon Rottenberg, 1956

He believed that no professional sports team would be successful if its competitors do not prosper sufficiently; in essence, the difference in quality of the competitor is not too dissimilar to it.

He hypothesised that matches with uncertain outcomes is more likely to be watched by fans. This would create more demand for the sporting industry, which means that unlike other industries, competition creates a better market for the sports' teams. There is no sports without competition and closer the competition, the more the demand for professional sports. This is the concept of **Competitive Balance** and the above hypothesis is called the **Uncertainty of Outcome Hypothesis**.

He also provided the **Invariance Principle** which stated that player talent in a league would go to the team that valued that talent the most, invariant of team revenues.

The concept of competitive balance has been subject to enormous research since Rottenberg's paper and several attempts have been made to manage competitive balance in different leagues.

Competitive Balance

The concept of competitive balance is fairly straightforward - an entirely predictable outcome in any sports contest would lead to a lack of interest from potential spectators, sporting is an entertainment industry after all. A better competitive balance means more match attendance, television money and further growth of the sport.

Competitive balance is often the justification given for several interventions introduced by different sports' administration bodies; these could be salary caps, transfer regulations, fixed budget and selling TV rights.

However, it's not as straightforward as it sounds. There is ample research to suggest that in various situations competitive imbalance is preferred, what if fans favour some teams over others? Stefan Szymansky's paper, "Competitive Balance in sports leagues and paradox of power (2006)" proves a paradox, according to him, "In a standard logit contest model, the strong do not win enough, i.e. more wins by the strong would

increase attendance or revenues”. He further states that this will only be true so long as the strong don’t become too dominant, this kills all unpredictability and eventually interest.

So there is more than enough substance in Competitive Balance theory, which has led to the development of various models for its measurement.

Measuring Competitive Balance

The 2015-16 English Premier League season saw Leicester City win the title. The team narrowly avoided relegation in the year before and betting companies were offering 5000-1 odds on them winning the league. This extraordinary feat did come with its perks, from Aug 2015 to Apr 2016, the club’s social media growth in the number of followers went up 736,554 to 4,556,411; a 518.61% increase.

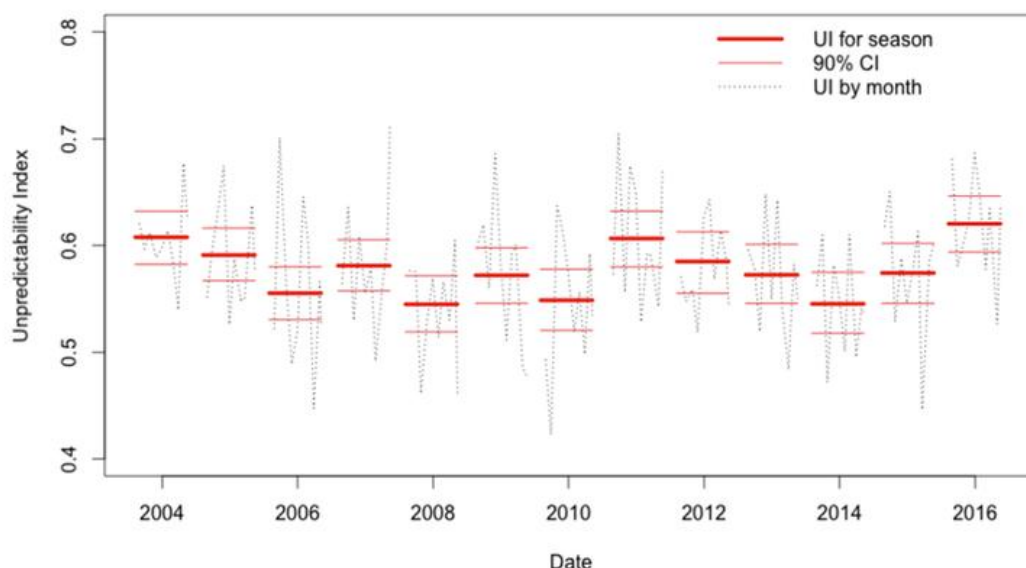
Everyone loves an underdog story, but how unprecedented was this feat? In the 25 years since the Premier League started, before that, only 5 teams ever won the title; this meant that such a performance from a team that was in the second division a couple seasons ago was highly unlikely.

In an article by Ian Mchale, Professor of Sports Analytics at the University of Salford, he uses one of the models to measure the unpredictability of the Premier League as compared to the past 10 years as well as to other big leagues across Europe.

The details of the unpredictability index was as follows,

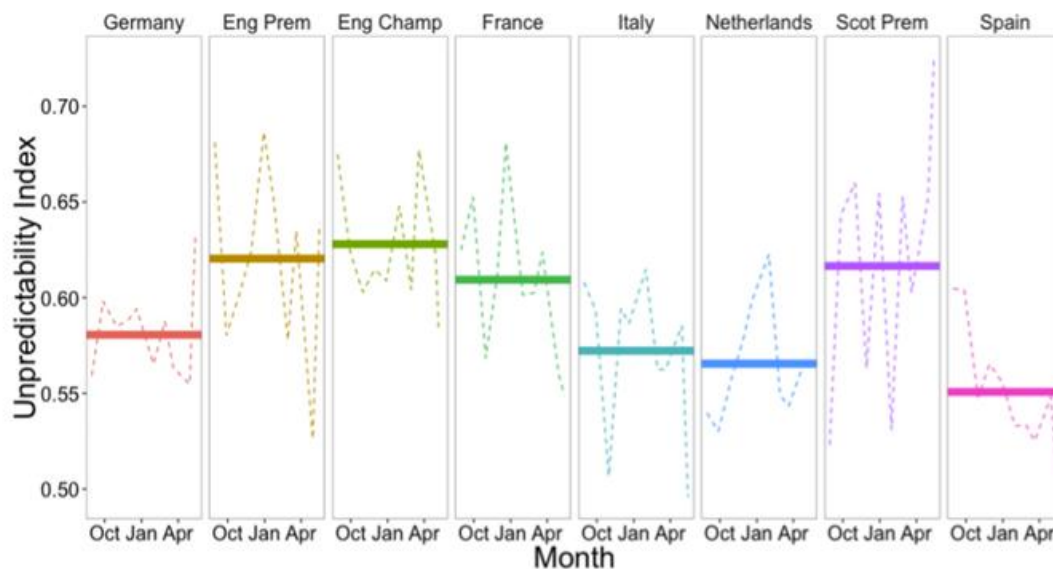
The unpredictability index for a match is given by $(H-pH)^2 + (D-pD)^2 + (A-pA)^2$ where H stands for home win, D stands for draw and A stands for away win. H is 1 if the match result is a home win, or 0 otherwise and pH is the probability of a home win. Similarly, D=1 if the match is a draw, and A=1 if the match is an away win, with pD and pA being the probabilities of a draw and away win respectively.

The probabilities were taken from historical bookmakers’ odds, essentially measuring how good the bookmakers’ predictions were.



Source: Ian Mchale, Professor of Sports Analytics, University of Salford

As it is quite clear from the above graph. The 2015/16 season was the most unpredictable since 2004 but if a 90% confidence level is considered, it is not too dissimilar to the previous seasons, as Mchale points out, and, there wasn't a fundamental shift in the predictability in the league. Apart from Leicester, most of the others did quite close to their true level and there wasn't much discrepancy in that regard.



Source: Ian Mchale, Professor of Sports Analytics, University of Salford

He also compared the unpredictability of the league with other leagues in Europe which shows that the English second division called the Championship was the most unpredictable league out of these, while the Premier League was in fact the most unpredictable top division league of the lot with Spain being the least predictable. This revelation partly proves the Competitive balance theory as the Premier League is the most popular league of the above making \$5.3 billion in revenue while the second on the list - the German Bundesliga, only makes \$2.8 billion. But there is more to the story, almost as unpredictable - the Scottish Premiership only makes a revenue of about \$200 million. This is mainly down to the relative lack of quality of Scottish Football on an international stage, which means it was a bit unfair to compare the Scottish league to the other leagues mentioned above.

There are many other measures of competitive balance. Few of them include,

- 1) Number of Championships won introduced by Rottenberg (1956)
- 2) Top k ranking
- 3) Surprise Index introduced by Groot and Groot (2003)
- 4) Winning percentages are measured and various tools of statistics such as range, standard deviations and Gini Coefficient are used to calculate winning percentages.
- 5) Gini Coefficient and Lorenz Curve introduced by Quirk and Fort (1992,1997)
- 6) Strength difference by Ordered Probit Model introduced by Koning (2000)

7) Hirfindahl-Hirschman Index (HHI)

8) Entropy used by Horowitz (1997)

9) National Measure of Seasonal Imbalance (NAMSI) introduced by Goosens (2006)

The National Measure of Seasonal Imbalance (NAMSI) is a widely used measure which compares the observed standard deviations of winning percentages with the standard deviation of a completely unbalanced league.

We propose the NAtional Measure of Seasonal Imbalance (NAMSI):

$$\text{NAMSI} = \frac{sd_{\text{season}}}{sd_{\text{certty}}} = \frac{\sqrt{\frac{\sum_{i=1}^n (\text{winperc}_i - 0,5)^2}{n}}}{\sqrt{\frac{\sum_{i=1}^n (\text{certwinperc}_i - 0,5)^2}{n}}} \quad 30$$

With i = team; n = total nr of teams; winperc = win percentage of team i ; certwinperc = win percentage of a team when there is complete certainty³¹

Source: Goosens (2006)

In a publication on his blog *Boyd Nation*, a Mississippi State University graduate calculated predictability across different sports, including baseball, basketball, American football, and ice hockey.

For this he uses ISR measures which are indicators of quality of teams, he calculates the range of ISR, competitive balance using a correlational measure of the ISRs of the last 5 years and he uses the ISR ranks of the champions of the five years to ascertain which sports permits more off beat champions.

He finds out that baseball is the most competitive sport of the above, which isn't too much of a surprise as there have been 7 different Champions in the last 10 seasons of Major League Baseball, while Ice Hockey is the least competitive with 5 teams sharing the winner's trophy in the last 10 seasons.

With the sheer number of different measures of competitive balance in sports it is often a challenge to find out which one is the most accurate. However, it is quite clear that it is very important to keep it at some optimum level such that revenue and audience involvement is maximised.

Aaron Clauset, a computer science professor at the University of Colorado, analysed 40000+ games from the last decade across different games like college football, pro football, pro hockey and pro basketball. He believed that data analysis of sports statistics looks at numbers about players or teams that often have little relevance to the game's outcomes. He found through his study that scoring rhythms remained stable throughout these kind of games. He found that there is little correlation between one point and another, and that momentum doesn't exist - just a random sequence of events occurs. Which means that the games are more balanced than it appears, he believes that the events during a game is more random and less unfair, victories are

often decided by a stroke of luck or a ball falling your way, thus, improving competitive balance and making the sports more entertaining.

Sports Policy

Sports Associations all around the world manage different leagues in their own best way. Some are draft/auction based leagues while others allow clubs to spend what they earn or raise. The policy decisions taken by these associations - such as salary caps, transfer restrictions, selling broadcasting packages, and forming new leagues - are often made keeping competitive balance in mind. Each of these come with their own advantages and caveats as well as opposition from some teams.

- 1) **Salary Caps-** Salary caps were introduced by the National Basketball Association (NBA) as well as in other professional sports league in the US like the NFL and the NHL. The premise of salary caps is that it limits the amount a team can spend on players' salaries. It has shown mixed results. While it seems that competitive balance in the NBA has fallen after the salary caps as shown by Owens and Totty (2011) it seems to have had the desired effect in the NHL as shown by Lipasti (2015). This is because of the difference in the format of the two different leagues as the NBA is quite different in its setup from the NHL.
- 2) **Transfer Restrictions-** Transfer regulations are seen primarily in non-draft leagues which is mostly prevalent in European football. The Union of European Football Association (UEFA) manages transfer restrictions in Europe. In September 2009, UEFA approved the concept of 'Financial Fair Play'(FFP), with its objectives being, "to introduce more discipline and rationality in club football finances, to encourage clubs to compete within their revenues, and to protect the long-term viability of European club football." The FFP regulations require clubs entering UEFA competitions to pay off their obligations in a timely manner and live within their revenues (the 'break-even rule') by establishing a maximum deficit amount for relevant expenses over relevant income for a monitoring period. Any violation of the FFP regulations often leads to transfer bans for the teams. Grabar and Sonin (2018) in their recent column, show that these kinds of regulations have been able to show results by creating a more level playing field.
- 3) **Broadcasting Packages-** Recent court judgement in the UK Restrictive Practices Court about the premier league broadcasting case saw the court deciding that selling the rights collectively as a league is in public interest rather than selling them individually. Similar cases can be seen in the US and other parts of Europe. This promotes financial equality as the TV money received is equitably distributed among the teams and thus promote competitive balance.
- 4) **New Leagues-** According to a recent paper by E Woodrow Eckard (2015), he pointed out that if the competitive balance in a league is low, the stronger teams tend to leave the league and create another or join another league that is more balanced. This can be seen from the evidence of European football again where leagues in a country are divided into divisions where the top teams at the end of each season move up a division and the last placed teams move down.

Conclusion

Stan Kroenke, the owner of Arsenal Football Club in England is famous for his quote, “Economics is about creating win-win situations, but in sports, someone loses”.

Since Rottenberg first looked at sports economics in 1956, we have come a long way - there is more money in sports, there is a worldwide interest and for many fans it's a religion. Data is collected in real time as the games are played, sports analytics has become more important than ever before, used for strategy as well as for research, and yet one of the most fascinating aspects of it still remains competitive balance and the Uncertainty of Outcome Hypothesis. The thrill of the game is in its unpredictability - who knew such a simple statement could be breeding ground for so much research. And as is said during many sporting events, this is true for Sports Economics too, “We're just getting started!”

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