

Section A

doi: 10.12863/ejssax4x1-2016x2

## The alleged causality between number of teams in a league and national team quality.

Kjetil K. Haugen

Faculty of Logistics Molde University College, Specialized University in Logistics

### Abstract

This article presents a simple linear regression between national football team quality and uncertainty of outcome in associated national leagues. The main results indicate no significant causal relationship between the variables, a conclusion somewhat contradictory to many practitioners argument on improving competitive balance in local leagues as a mean of improving national team quality.

**Keywords:** Uncertainty of outcome, FIFA rank, number of teams in league, causality.

### 1 Introduction

In [5] and [10], the problem of poor British national football team quality is addressed by a suggestion of reduction of the number of teams in the Premier League. This reduction would, according to the FA chairman – Greg Dyke – lead to fewer matches played in Premier League, and as a consequence, reduced exhaustion on the England national squad. Hopefully, this could lead to England players in better shape in the all so important international tournaments.

Norway, another nation with limited football success at the national level the latter years, has also discussed league team reduction; although with a slightly different

argumentation. Here, see [12, 13], the main argument has been that reduction of the number of teams in the top division will create improved competitive balance (or increased uncertainty of outcome) with the consequence that national team candidates playing in the Norwegian league would get a tougher competitive environment, better suited to 'produce' football players of higher quality. As a consequence, the national team should improve over time.

It is the latter argument being the focus of this article. Could improved competitive balance in national leagues have a positive effect on performance for the National team?

Unfortunately, both these arguments could be

reversed, playing less matches may remove exhaustion, but of course at the same time lead to less good practice, and hence, the opposite effect should be plausible. At the same time, players competing in a tougher league may lose more matches and hence lose confidence, or even worse, they may be forced out of local teams, outperformed by better foreigners. Hence, it is by no means obvious that team reduction is a certain road to better national teams.

Most of this type of arguments seems to be based on faith rather than evidence. As a consequence, it seems reasonable to try to test (in this case the Norwegian argument) empirically. Of course, uncertainty of outcome as well as football team quality is, not necessarily, easy to measure. In this case, it is even a matter of development over time. So, the task is surely not easy. On the other hand, a simple approach may at least shed some light on whether a hypothesis of increased uncertainty of outcome in local leagues has any impact on national team quality. If such a correlation (or indication of causality) simply is not present, or even points in a different direction, this ought to be of interest for football officials.

In this paper<sup>1</sup>, a very simplified empirical analysis aiming to check if empirical evidence relating uncertainty of outcome in national leagues and national team quality exists is performed. In section 2, some relevant literature is examined, accompanied by a short discussion on how uncertainty of outcome is measured. A short discussion of how national team quality is measured finalizes section 2. Section 3 presents the data used, as well as the results of a simple linear regression analysis. The final section – section 4 – concludes.

---

<sup>1</sup> The "article" comes more in the form of a research note than a proper research paper.

## 2 Some relevant research literature and methodology

In US sports, where leagues are constructed with profit as a relevant objective, it should not come as a surprise that league size (or number of teams in the league) is a question that has been addressed. Indeed, this is the case. Already in the classic paper by Quirk and El-Hodiri [15], the question is treated. Other US authors have followed up [11, 19], while Szymanski, applying Tullock's [18] model of a rent-seeking contest, tries to sum up in his excellent contribution [17].

The classic arguments in this brand of literature may perhaps be summed up as follows: Adding a new team to a league adds more matches and hence more (potential) revenue. On the other hand, adding a performance-wise bad team may lead to decreased uncertainty of outcome (predictability) and hence less demand. This constitutes a trade-off that could be optimized and hence equilibrium outcomes, as more than one team is involved.

This is of course, although very elegant, an extremely simplified view, which has limited impact and relevance for the potential link to national team performance – which is the topic here.

Apart from this work (discussed above), to the best of my knowledge, limited (or none) empirical work on potential causality between uncertainty of outcome in national leagues and national team quality exists.

Uncertainty of outcome (UoO), introduced by Rottenberg [16], is a complex phenomenon. The excellent review [2] gives a good survey on the topic and potential traps. More recent contributions [1, 4, 8, 14] indicate the popularity of the concept in sports economic and management research. The main (simplified) reason for such an inherent complexity may perhaps be the concept of time. Most measures of UoO are static, measuring 'distances' between teams on a league table based on points or ranks. However, such a measure can of course not

capture the 'win-dispersion' dimension – i.e. the same team winning each season. So, even if 'distance' between teams on a table is 'small', uncertainty of outcome may be considered low if the same teams have occupied (say) the three first places the last seasons.

Here, however, the most used (although perhaps not the most popular) approach is adapted, mostly due to the fact that the pretention of solid analysis is not the main point here. Hence, a 'static' measure for UoO is applied; namely the one introduced in [6].

This measure is straightforwardly logically constructed by introducing a league table with (theoretically) minimal competition. In such a league, the best team beats all other teams, the second best all other teams but the best and so on. Based on such a league, a total variation can be constructed by 'square-summing' differences between the actual league points, and the theoretical league of minimal competition. This square sum, could then be normed by dividing with the maximal total variation, also a square sum, where two theoretical leagues are compared; the previous one of minimal competition, and the other extreme alternative, a league of maximal competition, where all teams are equally good or all matches end in a draw. The resulting number,  $\rho_L$ , would then provide a measure for UoO measured as a percent (%).

Another argument for choosing this measure, apart from its logic straight-forwardness, is its inherent constructive computational characteristics – see for instance [7].

Just like uncertainty of outcome, measuring, or observing, football team quality is not necessarily straightforward. Luckily, a measure (although perhaps blur [9]) exists, namely the FIFA [3] rank. The neat thing about this measure is not it's potential lack of sharpness, but the simple fact that decisions of vital interest for football teams are made based on it. Qualifications for important tournaments, seeding etc. are made based on this ranking system. Hence, even tough (as shown in [9]) it may not be a very good quality measure, it is still almost always in all national teams best interest to climb as high as possible on the rank. As a consequence, it is a simple and reasonable team quality measure.

### 3 Empirical data an regression analysis

To produce data for the empirical analysis, the decisions made in section 1 were followed up, and one vector of numbers containing the chosen countries FIFA rank<sup>2</sup> was constructed. In addition, the UoO-measure (named  $\rho_L$  according to the notation in [6]) was calculated. Fortunately, an alternative project [7] had performed the necessary calculations, and these numbers<sup>3</sup> were used. The numerical information is so limited in size that all numbers are given in table 1

---

<sup>2</sup> The FIFA-rank of Januray 2017 was used.

<sup>3</sup> The last available finished tables were used for the calculations – mainly the 2015/2016 season.

**Table 1:** A complete data set.

	FIFA-rank	$\rho_L$
AUSTRIA	73,31	29
DENMARK	25,98	32
GERMANY	29,28	1
MACEDONIA	30,58	99
NORWAY	32,36	68
SLOVENIA	37,54	36
SERBIA	30,58	46
SWEDEN	24,22	39
UKRAINE	37,04	19
CROATIA	16,94	14
FRANCE	35,07	7
SPAIN	28,27	10

As table 1 indicates, all chosen countries were European. Surely, this may be seen as a choice of convenience, but European football is still (obviously) the most economically significant globally, and as such, relevant. Furthermore, different chosen countries are tried to cover both small and large countries, as well as good and bad (football-wise) – trying to get a reasonable spread in the observations. As can be observed, the best team GERMANY (no. 1 on the FIFA rank<sup>1</sup> as well as number 99 on the same rank are included. Finally, a reasonable spread in the UoO-values is also observed; ranging from Croatia (16,94% – low UoO) to AUSTRIA

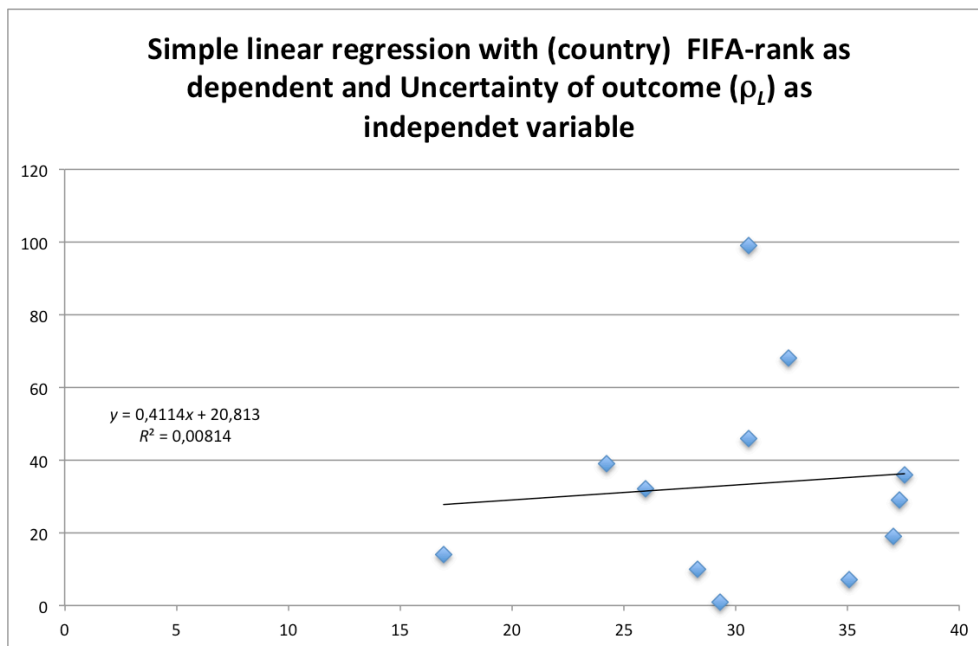
(37,31% – high UoO). Hence, it is assumed that the sample, at least to a certain degree can be considered representative.

Based on the data in table 1, a simple linear regression model with UoO as the independent- and FIFA-rank as the dependent variable is formulated. Parameters  $\beta_0$ ,  $\beta_1$  in this simple linear regression model – with standard assumptions on error terms  $\epsilon_i$ :

$$\rho_{L,i} = \beta_0 + \beta_1 \cdot \text{FIFA} - \text{rank}_i + \epsilon_i \quad (1)$$

are estimated in equation (1). The results are shown in figure 1.

**Figure 1:** A simple linear regression;  $\rho_L$  on x-axis, *FIFA-rank* on y-axis.



#### 4 Conclusions, limitations and suggestions for further research

As can be readily observed in figure 1, no obvious visual correlation between the two variables is identified. An  $R^2 = 0.00814$  confirms this, and at the same time, the positive sign of  $\hat{\beta}_1 = 0.4114$  should have been negative for the Norwegian football federations hypothesis to make any sense. This information raises the obvious question on whether any causal relation between the variables exists. Not surprisingly, a standard hypothesis test on  $\beta = 0$  cannot be rejected at a sensible significance level<sup>4</sup>.

The data used, indicate no link what so ever between uncertainty of outcome in European football leagues and quality of the national teams. Hence, the argument of a 'more intense playing ground' at home to improve

the national team is not supported at all.

Luckily, in Norway, the suggestion of reducing the number of teams, by the way suggested by the Dutch consultancy agency Hypercube, was never followed up. This research indicates perhaps that such a decision was wise.

One could of course always argue that the analysis presented her is very simplified, not covering all dimensions of team quality or various definitions of uncertainty of outcome, limited to a single point in time<sup>5</sup> or using the necessary amount of countries to secure representativeness, but still, it provides

<sup>5</sup> Surely, the analysis could have benefitted from looking at the problem over more than a single year. However, the scope and intention of this note was limited, and my guess is that similar correlation lacks would be evident if such an extension had been performed. Such a methodology would also implicate new methodological problems as (for instance) the FIFA-rank is an evolving measure making it challenging to make comparisons between years.

<sup>4</sup> Refer to appendix A for details in the SPSS-output.

relatively clear indications that making this type of decision could be tested and even questioned empirically. As a consequence, certain care should be taken if one wants to

argue that reducing the number of teams in a league is a sensible suggestion in order to achieve more success in big football tournaments involving national teams.

### Appendix A SPSS-Output in the regression

This appendix contains relevant SPSS-output from the regression:  $\rho_{L,i} = \beta_0 + \beta_1 \cdot FIFA - rank_i + \epsilon_i$

Figure 2: SPSS-output.

#### ➔ Regression

[DataSet1]

##### Variables Entered/Removed<sup>a</sup>

Model	Variables Entered	Variables Removed	Method
1	VAR00001 <sup>b</sup>	.	Enter

a. Dependent Variable: VAR00002

b. All requested variables entered.

##### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,090 <sup>a</sup>	,008	-,091	29,20055

a. Predictors: (Constant), VAR00001

##### ANOVA<sup>a</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	69,945	1	69,945	,082	,780 <sup>b</sup>
	Residual	8526,721	10	852,672		
	Total	8596,667	11			

a. Dependent Variable: VAR00002

b. Predictors: (Constant), VAR00001

##### Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	20,813	44,519		,468	,650
	VAR00001	,411	1,436	,090	,286	,780

a. Dependent Variable: VAR00002

## References

- [1] B. Buraimo and R. Simmons. Do sports fans really value uncertainty of outcome? Evidence from the Premier League. *International journal of sports finance*, (3):146–155, 2008.
- [2] A. Dawson and P. Downward. Measuring short-run uncertainty of outcome in sporting leagues. *Journal of sports economics*, 6(3):303–313, 2005.
- [3] FIFA. Fifa/coca-cola (men's) world ranking. <http://www.fifa.com/fifa-world-ranking/ranking-table/men/>, 2017. Accessed: 2017-03-14.
- [4] D. Forrest and R. Simmons. Outcome uncertainty and attendance demand: The case of English soccer. *Journal of the Royal Statistical Society, Series D (The Statistician)*, (51):229–241, 2002.
- [5] Mirror Football. FA chairman Greg Dyke 'wants to reduce the premier league to 18 teams'. <http://www.mirror.co.uk/sport/football/news/fa-chairman-greg-dyke-wants-6915869>, 2015. Daily Mirror – Accessed: 2017-03-14.
- [6] K. K. Haugen. Always change a winning team. Tapir University Press, Trondheim, 2012. ISBN: 978-91-637-4473-0.
- [7] K. K. Haugen and B. Guvåg. Recent rule changes in handball – adverse effects on uncertainty of outcome. *In review (unpublished)*, February 2017.
- [8] K. K. Haugen. Uncertainty of outcome and varying fan preferences – a game theoretic approach. *Mathematics for Applications*, 5(1):1–10, 2016.
- [9] I. McHale and S. Davies. Statistical analysis of the effectiveness of the FIFA World Rankings. In J. Albert and R. H. Koning, editors, *Statistical Thinking in Sports*, pages 77–90. Chapman and Hall, 2007.
- [10] J. D. Menezes. FA chairman Greg Dyke wants to reduce premier league from 20 clubs to 18 in bid to improve England national team. <http://www.independent.co.uk/sport/football/premier-league/fa-chairman-greg-dyke-wants-to-reduce-premier-league-from-20-clubs-to-18-in-bid-to-improve-england-a6752596.html>, 2015. The Independent – Accessed: 2017-03-14.
- [11] R. Noll and A. Zimbalist. *Sports, Jobs and Taxes*. Brookings Inst., Washington, USA, 1997.
- [12] A. R. Nordsetrønningen and T. Rørtveit. RBK og Molde vil redusere antall lag i eliteserien. <http://www.vg.no/sport/fotball/idrettspolitik/rbk-og-molde-vil-reducere-antall-lag-i-eliteserien/a/10145855/>, 2014. VG (In Norwegian) – Accessed: 2017-03-14.
- [13] A. R. Nordsetrønningen and T. Rørtveit. Vil kutte antall tippeliga-lag, endre ligasystemet og spille cupfinale i mai. <http://www.tv2.no/a/6204031/>, 2014. TV2 (In Norwegian) – Accessed: 2017-03-14.
- [14] T. Pawlowski. Testing the uncertainty of outcome hypothesis in European football – a stated preference approach. *Journal of sports economics*, 14(4):341–367, 2013.
- [15] J. Quirk and M. El-Hodiri. An economic model of a professional sports league. *Journal of Political Economy*, 79:1302–1319, 1971.
- [16] S. Rottenberg. The baseball player's market. *Journal of political economy*, 64(3):242–258, 1956.
- [17] S. Szymanski. The economic design of sporting contests. *Journal of economic literature*, 41(4):1137–1187, 2003.
- [18] G. Tullock. Toward a theory of the rent-seeking society. In J. M. Buchanan, R. D. Tollison, and G. Tullock, editors, *Efficient rent seeking*, pages 97–112. College station, TX: Texas A&M Univeristy Press, 1980.

. [19] J. Vrooman. Franchise free agency in professional sports leagues. *Southern*

*economic journal*, 64(1):191–219, 1997.

ACCEPTED