

Statistics of Survival in the English Football Premier League

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Article for *Significance*

In 2013/14 the English Football Premier League (EFPL) received record revenue of £3.26 billion, with its clubs showing record operating profits of £614m and pre-tax profits of £187m. This placed all twenty in the top 40 revenue earners worldwide¹. Therefore, it is no surprise that EFPL clubs attract investors; two-thirds of clubs in 2014/15 had changed majority ownership in the previous decade¹. Furthermore, twenty-eight English clubs have overseas owners, including the second-tier Championship, and lower divisions². Yet most investors leave disappointed, or rely on profiting on the sale to another investor, as despite the annual record revenues, losses continue to grow¹. Typical of chairmen of newly-promoted clubs, in 2011 Queens Park Rangers' (QPR) majority shareholder, multi-millionaire Tony Fernandes stated his "goal was to turn QPR into an established Premier League club"³. Presumably he meant a continuing (mid-table) presence thereby maintaining access to EFPL funds. However, he subsequently saw QPR avoid relegation on the final day of 2011/12, be relegated in 2012/13, be promoted in 2013/14, and be relegated in 2014/15; for 2012/13 the total wages QPR paid to all staff was £78m - £17m more than the club's entire income – with the total annual loss of £65m increasing the club's net debt to £177m. But QPR are not alone, as many clubs relegated from the EFPL have experienced financial problems, despite the existence of "parachute payments" to cushion the effects of relegation: eight clubs that went into administration soon after relegation from the EFPL were Bradford City (2002), Derby County (2003), Ipswich Town (2003), Leeds United (2007), Leicester City (2002), Portsmouth (2010), Southampton (2009) and Wimbledon (2003). Several others to have experienced significant financial difficulties include Birmingham City, Charlton Athletic, Coventry City, Norwich City, Nottingham Forest, Sheffield United and Sheffield Wednesday.

Clubs will fully understand the various financial issues: it costs a lot of money in transfer fees and wages to attract the top quality players required to maintain EFPL presence; and if a club is relegated it is difficult to retain or afford such players. But do they appreciate the probabilities involved with becoming "established" or the question of "second season syndrome", whereby promoted clubs suffer declining form and even relegation in their second season? These anecdotal terms are used widely in football and the media, but what are the related statistics? This article looks at the lengths of the spells that clubs have spent in the EFPL and suggests some answers.

Cohort of Established Clubs

It would clearly be fallacious for a newly-promoted club to assume that because only three of the twenty clubs in the EFPL are relegated each season, the probability of relegation is only $(3/20=) 0.15$. This is because of the presence of a cohort of established clubs which rarely, if ever, get relegated. Taking the final league tables for the EFPL from its inception in 1992/93 up to and including 2012/13, it is seen that forty-five clubs have been involved with a total of eighty-one spells. Figure 1 shows the distribution of the lengths of spells in relation to the period, and it is seen that seven clubs were present in each of the twenty-one seasons. These were: Arsenal, Aston Villa, Chelsea, Everton, Liverpool, Manchester United and Tottenham. It was also found that four clubs had been present for at least sixteen seasons in total, viz. Newcastle (19), Blackburn (18), West Ham (17), and Manchester

City (16). Clearly the seven ever-present clubs should be classified as “established”, and for the purposes of analysis it was deemed appropriate to draw a line under Manchester City because the next highest number of EFPL seasons for any club was fourteen, and the major financial investment in City means that it will almost certainly continue as an “established” member of the EFPL for the foreseeable future.

INSERT Figure 1: Lengths of Spells for Clubs in EFPL 1992/93 - 2012/13

Therefore, it was possible to determine the probabilities of newly-promoted clubs surviving in the EFPL assuming that there was a minimum of the seven ever-present clubs and a maximum of the above eleven established clubs. Together these eleven established clubs accounted for 51% of the total club-seasons (allowing for there being twenty-two clubs in the EFPL for its first three seasons, and twenty each season subsequently) despite only representing 24% of the clubs that have played in the EFPL. Consequently, the other thirty-four (76%) clubs account for the other 49% of the total club-seasons.

Determining Probabilities

To determine the probability of clubs avoiding relegation required analysis of the number of seasons in the spells that clubs had spent in the EFPL. To this end, two values of lengths of spells (LOS) were examined:

- A. The LOS of clubs truncated from 1992/93 onwards (i.e. the first season of the EFPL); and
- B. The LOS of clubs where the full LOS for all clubs that played in 1992/93 was used, i.e. using the date these clubs entered the English Football League Division One, the forerunner of the EFPL.

The importance of B is illustrated by the example of Nottingham Forest, which was relegated in 1992/93 having been promoted to Football League Division One in 1977; this spell is attributed a LOS of one season for A, but a LOS of sixteen seasons for B.

Role of Chance

Having calculated the determined probabilities the next question is whether these are greater or lesser than might be expected? From the above, if allowance is made for a cohort of established clubs, it could be argued that newly-promoted clubs are effectively competing in a mini-league of around ten clubs from which three will be relegated; meaning that the real probability of relegation is more like $(3/10 =) 0.33$. Therefore, although football is not a game of chance, one practical approach is to calculate comparator probabilities based on “pure chance”, i.e. assume that each club outside the established cohort has an equal chance of survival/relegation, and that consecutive seasons are independent of one another. The resulting comparisons thereby confirm the degree to which the determined probabilities vary from pure chance, and how this changes over time, with a view to informing consideration of “second season syndrome” and when a club might be considered “established”. The associated hypotheses were that “second season syndrome” would be reflected by a determined probability of survival below that of pure chance in the early seasons, and a club can be considered “established” when its determined probability of survival consistently exceeds that of pure chance.

Accordingly, the theoretical probability (P) of a club outside the established cohort avoiding relegation in a given season, on the basis of pure chance, is:

$$P = (T-E-R)/(T-E)$$

Where T is the total number of clubs in the EFPL (20); E is the number of clubs deemed to be members of the established cohort (7 and 11); and R is the number of clubs relegated from the EFPL (3). The probability of a newly-promoted club surviving n seasons is therefore P^n .

Results

Table 1 shows the above probabilities determined in relation to the first twenty-one seasons of the EFPL for both sizes of cohort of established clubs, and Figure 2 shows these graphically. The number of seasons was limited to twelve because for column 4 only one club had a spell greater than 12 seasons. It is noteworthy that column 1 and column 5 were identical for the first six seasons; only the latter is shown in Figure 2, because it is considered the more relevant of the two.

Arguably the results excluding the cohort of eleven established clubs are more relevant and pertinent to the current situation of the EFPL, compared to excluding the cohort of seven ever-present clubs. This is because it allows for Newcastle United, Manchester City and West Ham United. Accordingly, greater weight should be applied to the related results.

INSERT Table 1: Probability of Newly-Promoted Club's Survival Given Presence of Cohort of Established EFPL Clubs

INSERT Figure 2: Probability of Newly-Promoted Club Surviving First Eight Seasons

Concentrating on Full LOS, it was found that the mean number of seasons for all clubs in the EFPL was 8.5, but this reduced to 4.9 when the seven ever-present clubs were excluded, and 4.6 when the eleven established clubs were excluded. The corresponding figures for EFPL seasons only (i.e. LOS 92/93+) were 5.3, 3.8 and 3.3. These figures serve to highlight how short the spells can be for non-established clubs.

From Table 1 tests were undertaken to see if there were any significant differences between the four sets of determined probabilities (six different sets of matched pairs). For five of those matched pairs a p-value of less than 0.01 was observed, suggesting differences for each of those paired columns, with the remaining pair (column 1 and column 5) having a p-value of 0.23, reflecting their statistical similarity.

It is seen that the probability of survival for a newly-promoted club is much less than chance in the first two years: by 29.2% when the seven ever-present clubs were excluded and by 19.1% when the eleven established clubs were excluded (both LOS 92/93+). It is only in the third season that the theoretical and determined probabilities come into line, for where the eleven established clubs are excluded. This suggests that "second season syndrome" is a genuine phenomenon, if it is interpreted in terms of the probability of a newly-promoted club avoiding relegation in the first two seasons.

It is after the third season that the determined probabilities of survival are clearly higher than chance when the eleven established clubs are excluded, but it is after the fifth season when the seven ever-present clubs are excluded. So when can a club consider itself to be "established"? A

definitive statistical interpretation is impossible because it is a subjective description, and the nature of football is such that everyone has their own opinion. However, it is worth noting that of the fifteen clubs outside the established cohort of eleven, with a “1992/93+” LOS of five seasons or greater, there were only four in the EFPL in 2013/14: Southampton’s initial spell was thirteen seasons, but following relegation in 2004/05 the club returned to the EFPL in 2012/13; Fulham (12 seasons) were relegated at the end of 2013/14; and Sunderland (6 seasons) became only the second club to have been bottom of the EFPL at Christmas and avoid relegation, after acquiring thirteen points from the final six matches. Stoke (5 seasons) was the other.

In the circumstances, this author suggests that a club needs to have survived seven seasons before it can consider itself fully “established”. This is on the basis that it is at this point that the two sets of determined probabilities of survival begin to overlap, i.e. the impact of assuming different numbers of established clubs starts to disappear.

Varying Number of Clubs Relegated

The above results suggest that many clubs will continue to undergo cycles of promotion and relegation, with the attendant financial risks, despite the introduction of Financial Fair Play Regulations⁴. Therefore, if the EFPL wished to increase stability it could look to adjust the number of clubs relegated to two. It is possible to gauge the impact of this by applying the formula used above for calculating the theoretical probabilities. The impact is constant across the numbers of seasons, with an increase of 10.0% for where an established cohort of seven is excluded (range: 0.85–0.13) and 16.7% for excluding an established cohort of eleven (range: 0.78–0.05). However, this would mean that there would be less promotion from the Championship, and therefore getting agreement would be very difficult.

One variation that serves to generally increase the probability of non-established clubs avoiding relegation is for end-of-season play-offs involving a club, or clubs, from the top-tier, as well as clubs from the next tier. This happens in German football where the 16th-place club in the First Bundesliga (which has eighteen clubs compared to twenty in the EFPL) plays a two-leg relegation match against the third-place club of the Second Bundesliga for the final place in the following season’s First Bundesliga. If the outcome of such a relegation match was 50:50 and if the Bundesliga relegation arrangements were applied to the EFPL’s twenty clubs then the number of EFPL clubs that would be relegated each year would be 2.5 on average. Applying the same calculation, the theoretical probabilities in Table 1 would all increase by 5.0% for where an established cohort of seven is excluded (range: 0.81–0.13) and 8.3% for excluding an established cohort of eleven (range: 0.73–0.04).

Other Countries and Sports

The situation described above for the EFPL is not unique to England or football. The domination of top leagues by cohorts of established clubs which rarely, if ever, get relegated is quite common in sports and countries where the European promotion-relegation model is applied (i.e. the best teams in the highest ranking minor league are promoted to the major league, and the worst teams in the latter are reassigned to the former), although the size of cohort will vary. Examples of clubs never relegated include Athletic Bilbao, Barcelona and Real Madrid in Spanish football, and Ajax, Feyenoord, and PSV Eindhoven in Dutch football. In English Rugby Union Bath, Gloucester, Leicester Tigers and Wasps have been in the top flight league since its inception. Therefore the approach applied herein can be applied more generally.

Conclusions

It appears to be only a matter of time before newly-promoted EFPL clubs will be relegated. It is evident that the existence of a large cohort of established clubs means that the probability of survival is much less than chance in the first two years, which is consistent with the perceived phenomenon of “second season syndrome”. Newly-promoted clubs should take this into account in their risk analyses, to enable them to balance their financial and football strategies and not place the club itself in jeopardy. The often quoted ambition for these clubs to become “established” arguably requires seven years’ survival, for which the chances are only around 1 in 5. Given the long-term financial commitments involved in a business which is driven by short-term results on the pitch, this perhaps represents something of a gamble.

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