EC331: Research in Applied Economics

Win versus Profit Maximisation in the Football League: What Matters?

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(includes footnotes and tables)

ABSTRACT:

The paper aims to examine the extent to which win-maximisation and profit-maximisation represent a club's objective preferences. Data is gathered for the Premiership and the Championship for four non-consecutive seasons from Deloitte's Annual Review of Football Finance. This study is based on the model of Szymanski and Garcia-del-Barrio (2009), which calculates the best responses of each club under both win and profit maximisation to approximate league position under both hypotheses. I find that preferences are better approximated by win-maximisation for more successful clubs and profit-maximisation for lower-ranked clubs, and I analyse the reasons behind this finding.

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Section 1: Introduction

1.1 INTRODUCTION

"Some people think football is a matter of life and death. I assure you, it's much more serious than that." - Bill Shankly (1981).

The importance of playing success was thus unequivocally summarised by a foremost figure of the game. However, what about the importance of financial success?

The Premiership and Championship are respectively the richest league and the richest non-top-flight league globally (Deloitte Annual Review of Football Finance 2009), the former responsible for 56% of total European football debt (Union of European Football Associations 2010). Unsurprisingly therefore, under the last deal (2007 to 2010) Premiership teams received the substantial sum of £45 million annually in television rights (DARFF 2009).

The most successful clubs on the field in recent seasons (Manchester United, Chelsea, Arsenal and Liverpool) owed £2.3 billion alone according to the latest figures, with total Premiership debts of £3.4 billion (UEFA 2010). The statistic reflects the wages paid out by the most successful clubs to accommodate the most skilful players. However, financial takeovers can inflate the figures. As of June 2009, 15 of the 20 Premier League clubs were officially subsidised by owners (The Guardian 2009). Under ownership, clubs continue to operate with significantly negative profits, at a level which the literature portrays as unsustainable for a firm in the long-run. As of February 2010, Portsmouth became the first Premiership club to enter administration, having accummulated £70m of unsustainable debt largely through four owners in one season.

The question then arises: can a football club be modelled as a firm? If this is the case, theory suggests that it pursues profit maximisation. Rottenberg (1956), the earliest literature on the subject, highlights this hypothesis as the key underlying assumption for his model. Neale (1964) concludes the league itself is the firm, stating that clubs produce a joint product and there are utility streams borne from the matches played. Furthermore, Sloane's theoretical model (1971) is the first to consider utility maximisation as a club objective, thus spawning the origin of the long-standing economic debate of profit versus utility maximisation within sports economics.

This paper addresses the question within the context of the two premier divisions of the Football League. Data is collected for four seasons from the Deloitte Annual Review of Football Finance; the primary financial data source for English clubs since the formation of the Premier League in 1992.

I begin by detailing theories and literature on the subject to provide a framework for the investigation. My model is based on the work of Szymanski and Garcia-del-Barrio (2009), whose model considers both possibilities of profit- and win- maximisation by analysing the best responses of a club to the choices of its rivals. However, I also utilise the theoretical model of Sloane (1971), which identifies profit-maximisation as one of four possible maximisation objectives for the football club. The data is analysed using econometric and mathematical techniques, giving rise to a final result of economic and statistical significance, from which conclusions are finally drawn.

1.2 THEORY AND LITERATURE REVIEW

In all its conceptual vastness, microeconomic theory has long-debated profit-maximisation: arguably the most controversial economic theory at the firm level. Earlier work focuses on natural selection; Alchian (1950) asserting that firms whose decision-making processes most closely resemble profit-maximisation are more likely to survive, and thus the industry is a product of the hypothesis. In particular, he draws attention to competition in the goods, capital and labour markets driving firms towards the profit-maximisation outcome. Friedman emphasises the argument, highlighting "natural selection" as a validation of "returns-maximisation", since businesses will not survive unless undertaking this approach.

However, this is largely disputed. Dutta and Radner (1999) provide strong opposition, demonstrating that profit-maximisation (a firm run by a manager maximising profits) leads to bankruptcy when operating in a finite time period, and it is "survivalist strategies" that dominate the market. They show this by focussing on the costs of refinancing: a manager who is funded either has sufficiently high refinancing costs to scrap the asset, or refinances after every distress. In reality, the refinancing cost of each distress increases incrementally until it becomes high enough that the manager is better-off scrapping the asset. By this reasoning, football clubs have recently tended towards profit-maximisation since the private singular ownership of clubs has increased. They would therefore theoretically cease to exist in the long-run if modelled as a firm, which evidently has not been the case.

Rottenberg's (1956) analysis of the baseball labour market models individual teams as firms; each assumed to maximise with respect to profits. This contrasts Neale (1964), who models the league as one firm, on the basis that clubs produce a joint product from which there are direct and indirect utility streams to observers through match sales and close competition. Ultimately, the objective conclusion is the same, since Neale implies the league is a natural monopoly, and so pursues profit-maximisation. However, Sloane (1971) rightly alludes to the fact that the Football League acts as an institution setting the rules, and within these boundaries, clubs have freedom.

Sloane (1971) is the first to consider maximisation of multiple objectives, and his remains the foremost theoretical maximisation framework for football clubs:

$U=u(P, A, X, \pi_R-\pi_0-T)$

subject to $\pi_R \geq \pi_0+T$

Health of the league (X) is a measure of competition within the league, capturing the mutual interdependence that Neale argues must exist for clubs to remain as viable entities. Sloane argues that teams gain greater utility from hardly-fought wins than easy wins. Furthermore, the audience gains greater utility from close competition, and teams benefit through increased gate revenue. A healthier league therefore minimises variation, thus a calculated value close to one[1] theoretically increases a team's revenue. As Szymanski and Garcia (2009) show, performance is a statistically significant explanation of revenue and thus a control for competition is relevant for my model.

Sloane includes average attendance (A) because utility is derived from the atmosphere created by vast crowds and the subsequent effect on playing success. However, a more relevant but unmentioned channel is the impact on revenue. Large attendances result in greater gate receipts, which are a significant proportion of annual turnover. It could be argued that Sloane uses attendance as a proxy for revenue, but there is a stronger case for separating the two, since revenue is also largely determined by endorsements, television rights and prize money.

Drawing on the latter, Szymanski and Garcia-del-Barro (2009) base their approach on the principle that performance generates revenue, and in turn, wages generate performance. The theoretical relationship is represented empirically by a revenue and performance equation.[2] Revenue is regressed against performance and performance is regressed against wages, with the addition of lagged dependent variables. The explanatory variables in both cases are strongly significant. The measure for performance used is log-odds league position, implying that there are increasing returns to performance finishing below the league average, and decreasing returns when finishing above. Win percentage is typically used in previous work as the indicator of playing success, but Szymanski & Garcia-del-Barrio (2009) use league position on the basis that there is a correlation greater than 0.9. Furthermore, suppose a team secures the title with games in hand. Its objective in these final games may not be win-maximisation, but perhaps to give experience to younger players. Thus for continuity, I use league position as my gauge of playing success.

[1] Appendix: Description of variables.
[2] Equations specified in Methodology.

A drawback to the outlined estimating equations is the omission of relevant control variables, thus compromising the accuracy of the estimates. As conveyed earlier, average attendance is another source of revenue, and other variables capturing economic state may also have an effect; does a recession have a significant bearing on turnover?

The performance equation is bereft of one important attribute: player-specific data. Kesenne and Pauwels (2006) set up a simplified profit function denoting revenue as total gate receipts and costs as total wages. For win-maximisers, the function is maximised with respect to playing talent. This however is a restriction of the data of Szymanski and Garcia-del-Barrio (2009). However, they do indirectly imply wages as a proxy for player ability, which whilst effective does not consider that certain teams have larger squads and thus pay out greater salaries. As such, my preliminary model also includes variables for goals scored and goals conceded, which act as a more accurate proxy of player ability across all outfield positions.

The paper then combines the two equations to form a profit equation. Importantly, the expression substitutes out individual wage and revenue, implying average wage and average revenue determine profits[3]. Derivation with respect to P_{it} yields profit-maximising performance. The win-maximising performance is generated by equating the profit equation to zero.

The coefficients from the fixed-effects estimation of the initial revenue and performance equations are substituted in, subsequently yielding the respective profit and win-maximising league positions. The short-run model predicts that English teams finish above their profit-maximising position by a substantial 16 places, and below their win-maximising position by just under 4 places, suggesting that teams' choices are more closely replicated by win-maximisation. This result is predicted by the hypothesis of Sloane (1971), which highlights that teams remain financially viable despite losses in the long-run. He models profit as a constraint, implying clubs secure the minimum to remain financially existent.

Recent empirical work suggests that profit-maximisation does not accurately represent a club's preferences, as implied by initial papers by Rottenberg (1956) and Neale (1964). Szymanski and Garcia-del-Barro (2009) and Kesenne and Pauwels (2006) find that win-maximisation is a strong representative of the current club's objectives. Whilst it is possible that preferences have changed over time due to increasing prize money, the effect is not significant. The football club is now modelled foremost to represent a sports team as opposed to a firm, and this is the key difference from earliest literature.

[3] Mathematical Appendix.

Section 2: Methodology and Data Analysis

2.1 DATA SUMMARY

Data is gathered across four seasons (1995/96, 1998/99, 2002/03, 2004/05) from the Deloitte Annual Review of Football Finance. My focus is the Premiership and the Championship, meaning 44 clubs per season (176 observations) are analysed.

Promotion and relegation mean the same 44 teams are not present throughout the four years. This dataset consists of 61 different teams. The most successful Premiership teams have four seasons of data, whereas the lowest-ranking teams have only one. Thus, there may be selection bias, since lower-ranking clubs are relatively under-represented. Furthermore, seven clubs do not disclose financial statements in my sample, and so there is an insignificant attrition rate of 3.98%.

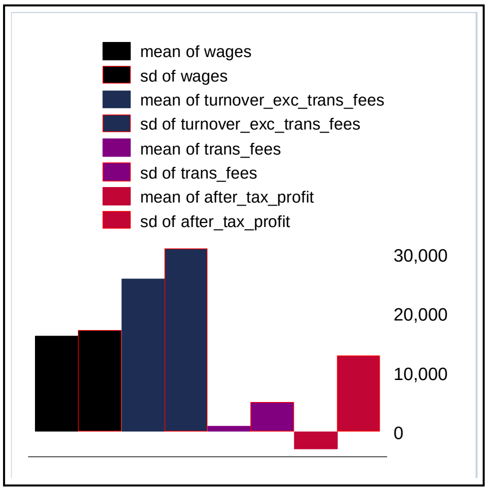
Below is a table of mean values for some key variables I will analyse.

Table 1. Means of variables.

Variable	Mean (Standard Deviation)
Win Percentage	35.92045 (12.1474)
Average Attendance	22450.1 (12290.53)
Health of the League	2.563731 (0.4766378)
After-tax Profit (£'000)	-2981.091 (12825.71)
Turnover (exc. Transfer fees) (£'000)	25860.75 (30972.77)
Wages (£'000)	16165.88 (17108.79)
Net Transfer fees receivable (£'000)	1024.758 (5028.799)
Goals Scored	54.8125 (13.51757)
Goals Conceded	54.875 (13.30848)

Note that average wages are 62.5% of annual turnover. The two are regressed separately, thus avoiding problems of multicollinearity suggested by a significant correlation of over 0.9. Interestingly, a mean win percentage of 35.9% suggests that the Football League is quite competitive. This is contradicted by the value of 2.56 for health of the league, suggesting significant variation across the league. Reverting to the initial hypothesis, the fact that average after-tax profits are negative suggests that clubs' preferences may not be accurately represented by profit-maximisation, since long-run losses are not viable. Below is a bar chart graphing the mean and standard deviation of the financial variables.

Figure 1. Mean and Standard Deviation (Financial Variables)



For net transfer fees and after-tax profits, standard deviation as a proportion of the mean is 490.73% and 430.24% respectively. Their high spread is indicative of their substantial variability between seasons, and thus for a given season their impact on turnover and wages could be very significant. Below I take a closer look at wages and turnover.

Table 2. Correlation matrix (Garcia-del-Barrio & Szymanski variables).

	League Position	**Wages**	**Turnover (exc. TF)**
League Position	1		
Wages	-0.6357*	1	
Turnover (exc. TF)	-0.6705*	0.9543*	1

Evidently, these correlation coefficients strongly support the relationship cited by Szymanski and Garcia-del-Barrio. The relationship of league position with both turnover and wages is strongly significant. Thus, it is likely that there is causality between league position, turnover and wages, although correlation does not strictly imply causality. The negative coefficients occur since the lower the league position, the more successful the team. Successful teams thus pay out greater wages and generate greater revenue.

Table 3. Correlation matrix (Sloane variables).

	League Position	**Avg. Attendance**	**Health of the League**	**After-tax Profit**
League Position	1			
Avg. Attendance	-0.7951*	1		
Health of the League	-0.4623*	0.4946*	1	
After-tax Profit	0.0832	-0.0685	-0.0906	1

Above are the variables Sloane underlines as possible maximisation objectives. In his paper, he emphasises the strong correlation that likely exists between playing success, attendance and profit, and whilst the latter two exhibit this behaviour, profit is uncorrelated and insignificant. Its indifferent relationship with league position illustrates that profit-maximisation and win-maximisation lie at opposite ends of the spectrum and bear no major relationship. The strong correlation between league position and attendance suggests successful teams generate a higher average attendance or as Sloane (1971) argues, higher attendance induces better performance. I argue the former and moreover, gate receipts are important for revenue, and a significant correlation of 0.8372 demonstrates this strong relationship.

Overleaf, I take a closer look at the theoretical relationships hypothesised by Szymanski and Garcia-del-Barrio (2009).

Figure 2. League Position vs. Turnover/Profit.

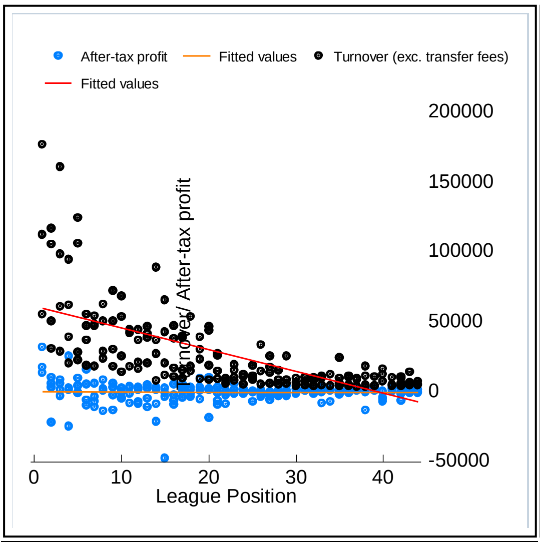
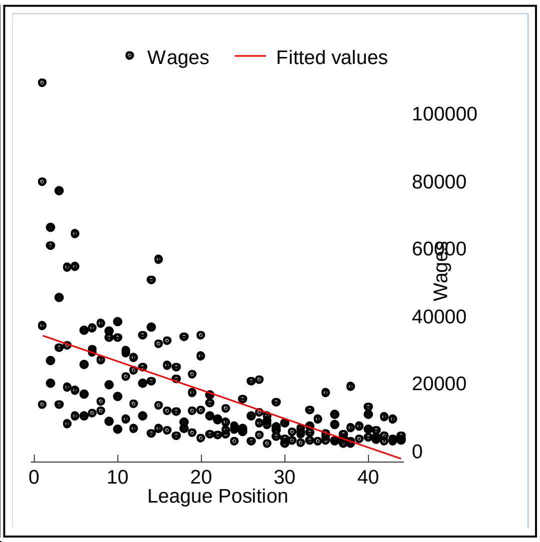


Figure 3. League Position vs. Wages.



The leftmost graph clarifies that, as earlier evidenced by correlation and mean values, profit is uncorrelated with league position. Higher-finishing clubs also generate more revenue, as expected, but the rewards are exponentially greater for the very highest-finishing clubs. Does this incentivise win-maximisation? Equally, the relationship between wages and league position is similar to revenue and league position, albeit more closely resembling a straight-line. This suggests that the spread of talent in the Football League is more evenly distributed than the rewards, with the better clubs naturally securing the services of the best players.

2.2 METHODOLOGY

As prevalent in the literature, I use fixed-effects estimation in order to hold the average effect of each team constant. This method also allows unobserved heterogeneity, in the form of player ability, to be correlated with included variables. Naturally, player ability has a large impact on league position. Consequently, Szymanski and Garcia-del-Barrio (2009) identify wages as a proxy. Furthermore, my empirical approach also considers goals scored and goals conceded to further account for player ability.

My approach resembles that of Szymanski and Garcia-del-Barrio. As outlined earlier, the foundation rests on the revenue and performance equations:

$$\ln\left(\frac{R_{it}}{R_t}\right) = \alpha + \beta_i + \gamma \ln\left(\frac{45 - P_{it}}{P_{it}}\right)$$

Revenue equation.

$$\ln\left(\frac{45 - P_{it}}{P_{it}}\right) = a + b_i + c \ln\left(\frac{W_{it}}{W_t}\right)$$

Performance equation.

I first run dynamic regressions of the revenue equation (thus including lagged log relative turnover) and the performance equation (including lagged log-odds league position). Logarithms are used to normalise distribution. For my data, normal quantile plots for turnover, performance and wages graph a clear non-linear relationship about the normal.

A profit equation is then formed by combining the two equations and rearranging them to satisfy the relationship that profit equals revenue minus wages:

$$\pi(P_{it}) = \overline{R}_t \left(\frac{45 - P_{it}}{P_{it}} \right)^{\gamma} e^{\alpha+\beta_i} - \overline{W}_t \left(\frac{45 - P_{it}}{P_{it}} \right)^{\frac{1}{c}} e^{-\frac{a+b_i}{c}} - F + I$$

Profit Equation[4].

Derivation of the profit equation with respect to P_{it} yields the profit-maximising performance:

$$P_{it}^{*} = \frac{45}{1 + \exp\left(\frac{a + b_i + c(\alpha + \beta_i) + c\ln \overline{R}_t - c\ln \overline{W}_t + c\ln(c\gamma)}{c\gamma - 1} \right)}$$

Profit-maximising performance.

If zero profits are assumed (variable income equals fixed expenses), win-maximising performance is derived:

$$P_{it} = \frac{45}{1 + \exp\left(\frac{a + b_i + c(\alpha + \beta_i) + c\ln \overline{R}_t - c\ln \overline{W}_t}{c\gamma - 1} \right)}$$

Win-maximising performance.

For both revenue and performance equations, OLS, fixed-effects and IV fixed-effects regressions are run, the former with robust standard errors since they are more efficient and account for heteroskedasticity. The fixed-effects estimation uses clustered standard errors to account for error within observations for each team. The IV fixed-effects estimation accounts for the endogeneity exhibited by the lags, which are correlated with the error term since they are likely to pick up unobserved heterogeneity from previous years. Elimination of variables is based on statistical and economic insignificance.[5] The fixed-effects estimates[6] are finally substituted into the win and profit-maximisation performance equations, generating estimates for league position under both win- and profit-maximising hypotheses.

Furthermore, I introduce a number of control variables in order to attain accurate estimates and reduce omitted relevant variable bias.[7] Average attendance is the greatest source of revenue for a club and thus I include it as a revenue control. Sloane (1971) underlines its effect on performance, but the relative effect is greater on revenue. Moreover, the quantification of the effect on performance is subjective and difficult to ascertain.

The final model is based on statistical and economic significance. The latter in particular allows the predictions for league position under win and profit-maximisation to more accurately depict the reality of a club's preferences.

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[4] Mathematical Appendix.
[5] Appendix: Tables 1-8.
[6] Appendix: Tables 9-10.
[7] Appendix: Table 3.

Section 3: Empirical Analysis and Results

3.1 EMPIRICAL ANALYSIS

Following rigorous analysis and testing[8], below are the final regressions for the revenue and performance equations.

Figure 4. Revenue equation.
Dependent Variable: Log Relative Turnover {Turnover/ Avg. Turnover}.

	OLS	**Fixed Effects**
Log-odds League Position	0.2657 (7.97)*	0.2274 (6.01)*
Average Attendance	0.0415 (8.69)*	0.0149 (2.11)*
UK Q4 GDP Growth	0.1229 (2.08)*	0.0593 (1.21)
Constant (α)	-1.7255 (-8.53)	-0.9450 (-4.84)
Instruments	No	No
R^2	0.8559	0.8391
F-statistic	264.23	19.76
Probability > F	0.0000	0.0000
No. of observations	165	165

OLS: Robust standard errors. FE: Clustered standard errors.
T-statistics in parentheses.

Paying particular attention to the fixed-effects estimates, the high R^2 value indicates the strong explanatory power of this model. The key finding is the strong significance of the league position variable, which supports Szymanski & Garcia-del-Barrio (2009). A 10% increase causes a 2.27% increase in turnover, illustrating the increasing financial rewards the higher a club finishes. Its coefficient indicates that it is the biggest determinant of revenue. However, average attendance is also significant. A unit increase results in a proportionate rise of £15 in turnover, which is a large change for a unitary increase given a mean attendance of 22450.1. This result reinforces Sloane (1971) on its importance in the choice of maximisation objectives.

I represent economic state by GDP growth, and the OLS estimate indicates that club revenues are affected by the state of the economy. Its inclusion in my final model is attributable to the fact that these coefficients are generated despite my dataset solely encompassing seasons in which the UK economy remained stable. The findings indicate that revenues in the current economic climate could have been damaged, and the prevalence of clubs entering administration this season serves as strong substantiation. On the other hand, my own findings for average attendance and the increase of average revenue over time provide a valid counterpoint. Over the period 1994-2004, revenues have risen from under £20000 to over £100000 (Szymanski & Garcia-del-Barrio 2009). As evidenced by these regressions average attendance is a key cause. A recession decreases consumer confidence and thus expenditure, but the trends displayed by gate receipts point to inelastic demand for match sales, most probably due to increased provisions for season ticket sales over the same period.

Figure 5 overleaf illustrates the performance equation estimation.

[8] Appendix: Tables 1-8.

Figure 5. Performance Equation.
Dependent Variable: Log-odds League Position {ln((45-League Position)/League Position)}

	OLS	**Fixed Effects**
Log Relative Wages	1.1557 (15.09)*	1.2581 (5.05)*
Win Percentage	0.0623 (6.73)*	0.0629 (6.31)*
Health of the League	0.5150 (4.00)*	0.3080 (2.32)*
Goals Scored	-0.0251 (-3.88)*	-0.0291 (-3.56)*
Goals Conceded	-0.0063 (-0.99)	-0.0111 (-1.39)
Constant (a)	-1.4341 (-2.39)	-0.4145 (-0.59)
Instruments	No	No
R^2	0.8315	0.8273
*F-statistic**	143.60	23.42
Probability > F	0.0000	0.0000
No. of observations	164	164

OLS: Robust standard errors. FE: Clustered standard errors.
T-statistics in parentheses.

Again, the regression is characterised by strong joint significance and high explanatory power, although the R^2 value in this estimation is less reliable than the revenue equation since there are more explanatory variables. Following the addition of multiple controls, wages nonetheless assume the greatest importance, as Szymanski & Garcia-del-Barrio predict; a 1% increase in wages translates to an increase of 1.25% in league position. Its magnitude is also attributable to player ability, for which it acts as a strong proxy. A club paying greater wages is likely to have players of better ability and as such finishes higher in the league table. Equally however, reverse causation between wages and league position is possible if win bonuses are considered. Hence, finishing high directly causes wages to increase. In truth, such bonuses are relatively small, since intense competition amongst elite clubs to hire the best players manifests itself in the form of high fixed-wage contracts.

Strong competition also has a significant effect on performance. By definition, if health of the league equals one, there is no variation across the league (perfect competition). This coefficient suggests then that less competition results in better performance for a team. Intuitively, this is because it implies a greater proportion of the league is less successful than the respective team, and thus the team finishes higher. Sloane originally identifies the variable as a maximisation objective because clubs derive greater utility from a hard-fought win than an easy win. Applying this logic to this model, he theorises that teams prefer the coefficient on health of the league to be negative; implying they prefer to perform better in the presence of stiffer competition. That this is not the case empirically is because teams derive equal utility from any win since quantitatively the reward is the same (3 points). Differentiating utility on a micro-level (per game) would require a much richer dataset where individual matches are analysed.

Finally, the number of goals scored is expected to have a positive correlation with playing success, although my findings suggest every extra goal causes a small proportionate reduction in league position. Similarly, statistical estimation contradicts the expected findings for goals conceded. The coefficients in both cases are minimal, and the effect may be explained by the attacking nature of teams in the league meaning that games are more open. Thus attempting to score also leaves the defence susceptible to concede, and teams scoring many goals are then less likely to win the game.

3.2 RESULTS: TABLE OF APPROXIMATED LEAGUE POSITION

Figure 6 below summarises the approximation of league position having calculated the best responses of each club under both profit- and win-maximising hypotheses.

Figure 6. League position under profit- and win-maximising hypotheses.

Team*	Real Position**	Profit-max Position	Win-max Position
Manchester United	1.5	25	5
Arsenal	2.75	23	5
Chelsea	4.75	26	6
Liverpool	5	26	6
Everton	7.75	30	8
Newcastle United	8	30	8
Aston Villa	9	28	7
Tottenham Hotspur	9.5	23	5
Middlesbrough	9.75	25	5
Blackburn Rovers	11.75	27	6
West Ham United	14.75	25	5
Southampton	15.5	21	4
Leeds United	16.5	27	6
Charlton Athletic	16.75	23	4
Bolton Wanderers	17.25	25	5
Sunderland	20.75	38	16
Birmingham City	21	33	11
Derby County	23	35	12
Leicester City	23	34	11
Nottingham Forest	24.5	31	9
West Bromwich Albion	24.75	21	4
Ipswich Town	25	34	11
Sheffield United	27	33	11
Crystal Palace	27.25	32	10
Coventry City	27.5	29	8
Norwich City	28	32	10
Portsmouth	29.25	35	13
Wolverhampton Wanderers	30.25	34	11
Watford	34.75	37	15
Mean variation from real LP		**11.2241**	**-9.5862**

**Only teams with 4 seasons of data.*
***4 season average.*

3.3 IMPLICATIONS

It is clear that the win-maximising approximation over-predicts league position whilst profit-maximisation does the opposite. Moreover, the results show win-maximisation more accurately predicts the league position of teams who typically enjoy greater playing success over the four seasons. The financial rewards that exist for successful performance at the top of the league are the significant explanation. On top of the prize money for a high league finish, which is substantially greater for the top clubs, there is also a place in the lucrative Champions League for the top four and the Europa Cup for the next three. Moreover, greater demand ensures profitable endorsement opportunities for the best teams.

Equally, profit-maximisation more closely replicates league position for lower-ranked teams. The most financially rewarding achievement beyond the Premiership is winning the Championship, and this is significantly less financially beneficial in absolute terms, although significant in relative terms. The bottom-line is that there are fewer incentives to win at the lower level. Even in higher-level competitions where monetary rewards could be forthcoming (the FA and Carling Cups), reduced ability hinders significant progress. As such, survival strategies to remain viable in the long-run may be adopted, as theorised by Dutta and Radner (1999). In the short-run, this behaviour manifests itself in the form of profit-maximisation.

Approximation under both hypotheses does capture, albeit underestimate, the expected change in league position as playing success falls. Win-maximisation changes by 10 places from the strongest club to the weakest, and the corresponding figure for profit-maximisation is 12 places. In this sense, it resembles the results of Szymanski and Garcia-del-Barrio (2009), since it accurately replicates the relative ranking order of actual, win- and profit-maximising position. The fundamental difference occurs in the absolute rankings. Whilst their findings suggest clubs finish 16 places above the profit-maximising position and 4 places below the win-maximising position, I find that clubs finish just over 11 places above the profit-maximising position and just over 9.5 places below the win-maximising position. It is important to remember that both hypotheses are the two ends of the scale, and clubs lie at some point in between. My results indicate that football clubs sit more centrally, but still favour win-maximisation. Considering the analysis only considers the top two divisions of the Football League, the overall result is expected given my earlier argument that clubs that are more successful prefer win-maximising.

However to further reinforce this point, I recalculated the win- and profit-maximising positions, but this time including teams with less than four seasons of data. These teams are likely to have been less successful since their absence in a given season is attributable to relegation from the Championship.

Figure 7. Mean profit- and win-maximising position variation with different sample sizes.

No. Of Seasons	Profit-max mean variation	Win-max mean variation
4	11.2241	-9.5862
4 and 3	10.3081	-11.0270
4, 3 and 2	8.0085	-12.9149

Assuming that teams for which there are three seasons of data are better than teams with two, I find that the profit-maximising approximation increases in accuracy and the win-maximising approximation decreases in accuracy. Since the number of less successful teams increases, the profit-maximising outcome is expected to replicate reality more closely, given the aforementioned preference for financial survival of lower-ranked teams. However, more interesting is the magnitude of the change. There is a difference of nearly 5 places in absolute value between the profit- and win-maximising approximations when all teams are included, compared to a gap of around 1.6 when only teams with a full dataset are used. This strengthens the view that win-maximisation is only pursued by the most successful clubs. If incentives to win remain heavily favourable towards the Premiership's top teams, it is likely that short-run profit-maximising tactics are likely to prevail within the Football League as a whole, and the quality of football on offer may suffer as a result.

Section 4: Conclusions

4.1 CRITIQUE

The major criticism is the deficiency of available data, which restricts my analysis to an extent. The fact that only four non-consecutive seasons are studied not only limits the inferences that are drawn, but also means that the lagged estimates that are significant in the theory are inefficient and therefore dropped from my final model. Furthermore, the nature of relegation from the Championship means the dataset includes some selection bias. Lower-ranking teams are under-represented, and my findings suggest that a more equal distribution could have increased the profit-maximising outcome.

I have added controls that mean my coefficients are more reliable. However, there are certain important variables that are not considered. The paucity of player-specific data means that no inferences can be made about the impact of specific transfers and their role in determining maximisation preferences. A possible weakness is that fixed costs (stadium expenditure for example) are not considered in the revenue equation. However, they are ultimately independent of league position.

There are also no strong instruments to control for the endogeneity between league position and revenue or league position and wages, both borne through reverse causation. However, in reference to the former, not much is empirically achievable without a breakdown of revenue expenditure.

4.2 EXTENSIONS

Beyond the obvious extension of conducting this analysis with more seasons and player-specific controls, there is scope to introduce long-term objectives into the analysis. Szymanski and Garcia-del-Barrio (2009) create a dynamic model in order to do so, but their study is bereft of in-depth analysis. What if clubs win-maximise in the short-run with a view of long-run profit-maximisation? Is prize money invested to secure the long-term financial stability of the lower-ranked clubs? Do higher-ranked clubs have a greater propensity to consume in the short-run? These are all questions a dynamic model considering multiple lags can answer, and would provide a deeper insight into the maximisation objectives of football clubs.

Another area of improvement is to separate the Premiership and the Championship. In doing so, a more thorough understanding can be gained into reward distribution and the point at which objective preferences change instead of a generalized conclusion being reached.

Finally, application of this analysis to the most recent seasons may generate significant results, especially following takeovers of Chelsea and Manchester United in 2005 after which owner subsidisation increased significantly. Could this indicate an increasing importance of profit-maximisation in the Football League? It would also provide an insight into the effect of the recession on club revenues, providing a renewed significance to the GDP growth variable in my final model.

4.3 CONCLUSIONS

This analysis does highlight a number of key findings. Empirically, there is strong support for Sloane (1971). On top of playing success and after-tax profits, the health of the league and average attendance are both significant determinants of clubs' maximisation objectives through their effect on performance and revenue respectively.

In terms of the initial hypothesis, win-maximisation more closely replicates the choices of the most successful Premiership clubs, whereas profit-maximisation more accurately reflects the preferences of the lower-ranked Championship sides. Furthermore, the latter effect dominates when all clubs are included, indicating the greater proportion of teams favouring profit-maximisation in the two leagues. This conclusion contradicts the most recent literature and the use of current data reinforces this conclusion further, since it could encompass the effect of the economic downturn as well as the recent influx of financial takeovers. One can then argue that the football club, particularly lower league, has shifted along the spectrum towards more closely resembling a firm and the profit-maximising outcome. Moreover, the increasing number of clubs falling into administration: most recently Portsmouth (the first-ever Premiership club to do so), supports this finding. Nevertheless, win-maximisation remains important as ultimately performance and thus revenue is decided on the pitch; the job of a football club is after all to play the game. However, unless win incentives become more evenly distributed across the Football League, win-maximisation will continue to more closely resemble the choices of only the elite Premiership sides, and survival remain the preference of the large remainder of the Football League.

5.1 APPENDIX

Written description of variables

Log-odds league position - The league position of a team in a given season. Note Championship teams are treated as a continuation of the 20 Premiership teams and are thus ranked 21-44. Transformation implies increasing returns if league position value is lower and decreasing returns if it is higher. Log used since variable exhibits non-linear trend about the normal.

Log Relative Turnover (exc. Transfer fees) - The turnover of a team in a given season excluding activity in the transfer market. Determinants include gate receipts, endorsements and prize money. Transformation captures proportion of turnover one team contributes to the league. Log used since variable exhibits non-linear trend about the normal.

Log Relative Wages - The wages paid out by a team in a given season. Can act as a proxy for player ability since higher wages are paid out to players with more ability. Transformation captures proportion of wages one team pays out relative to the league. Log used since variable exhibits non-linear trend about the normal.

Win Percentage - Continuous variable representing the percentage of games won over the course of one season by each team.

Scaled Attendance – Average attendance/1000. Continuous variable representing the average stadium attendance over the course of one season for each team.

Health of the League – Avg. win percentage of top 4 teams/ avg. win percentage of bottom four teams. Calculated individually for the Premiership and Championship each season. Value of one indicates a perfectly competitive league.

Log Relative After-tax profit - After-tax profit of a team for one season. Accounts for transfer fees. Calculated as pre-tax profit – tax charge. Accuracy of model can be tested by comparing predicted values with these actual values.

Log Net Transfer Fees Receivable - Net activity in the transfer market for a team in a given season. Transformation captures proportion that one team contributes to the league.

Goals Scored – The number of goals scored in one season by each team.

Goals Conceded – The number of goals conceded in one season by each team.

City Population – Population of the city in which the team is based. Data from the 2001 Census.

UK Q4 GDP Growth – 4th quarter used since it coincides with the beginning of the football season. Data collected from UK National Statistics. GDP growth used to capture economic state of the UK economy.

Mathematical description of variables (where applicable)

Log-odds league position - $\ln\left(\dfrac{45-P_{it}}{P_{it}}\right)$

Log Relative Turnover (exc. Transfer fees) - $\ln\left(\dfrac{R_{it}}{\overline{\overline{R}}_t}\right)$

Log Relative Wages - $\ln\left(\dfrac{W_{it}}{\overline{\overline{W}}_t}\right)$

Log Relative After-tax profit - $\ln\left(\dfrac{\pi_{it}}{\overline{\overline{\pi}}_t}\right)$

Log Net Transfer Fees Receivable - $\ln\left(\dfrac{TR_{it}}{\overline{\overline{TR}}_t}\right)$

Preliminary Regressions

1. Replication of Szymanski & Garcia-del-Barrio (2009).

Table 1. Revenue equation.
Dependent Variable: Log Relative Turnover {Turnover/ Avg. Turnover}.

	OLS	Fixed Effects	IV Fixed Effects
Log-odds League Position	0.3585 (12.57)	0.2946 (7.66)	0.2988 (-1.46)
Log Relative Turnover (-1)	0.4434 (7.11)	-0.0904 (-0.50)	-0.2218 (6.62)
Constant (α)	-0.2856 (-7.11)	-0.3508 (-9.09)	-0.3760 (-8.05)
Instruments	No	No	Wages (-1)
R^2	0.8870	0.7256	0.5090
*F-statistic**	560.45	29.46	88.24
Probability > F	0.0000	0.0000	0.0000
No. of observations	97	97	97

**Chi^2 instead of F-statistic for IV estimation.*
OLS: Robust standard errors. FE: Clustered Standard Errors.
T-statistics in parentheses.

Table 2. Performance Equation.
Dependent Variable: Log-odds League Position {ln((45-League Position)/League Position)}

	OLS	Fixed Effects	IV Fixed Effects
Log Relative Wages	1.8633 (8.73)	1.9379 (4.24)	2.5503 (4.71)
Log-odds League Position (-1)	-0.1248 (-1.11)	-0.3459 (-2.32)	-1.0702 (-2.44)
Constant (a)	0.7554 (8.69)	-0.8726 (6.83)	1.3142 (4.53)
Instruments	No	No	Win (-1)
R^2	0.7301	0.7100	0.3563
*F-statistic**	119.41	9.05	41.58
Probability > F	0.0000	0.0005	0.0000
No. of observations	100	100	100

**Chi^2 instead of F-statistic for IV estimation.*
OLS: Robust Standard Errors. FE: Clustered Standard Errors.
T-statistics in parentheses.

Table 3. Ramsey RESET test for omitted relevant variables: OLS Theory model.

	F-statistic	Probability > F
Revenue equation	1.38	0.2551
Performance equation	3.11	0.0300

H_0: No omitted relevant variables.
H_1: Omitted relevant variables.

Revenue equation: Do not reject H_0.
Performance equation: Reject H_0.

2. Addition of controls.

Table 4. Revenue equation.
Dependent Variable: Log Relative Turnover {Turnover/ Avg. Turnover}.

	OLS	Fixed Effects	IV Fixed Effects
Log-odds League Position	0.2864 (10.20)	0.2432 (5.60)	0.2459 (4.89)
Log Relative Turnover (-1)	0.2544 (2.95)	-0.1007 (-0.57)	-0.2019 (-1.35)
Average Attendance	0.0232 (3.61)	0.0261 (1.97)	0.0267 (2.22)
City Population	Negligible	Negligible	Negligible
UK Q4 GDP Growth	0.1139 (1.93)	0.1326 (2.50)	0.1288 (1.48)
Constant (α)	-1.2535 (-4.25)	-1.4031 (-3.35)	-1.4161 (-2.82)
Instruments	No	No	Wages (-1)
R^2	0.9042	0.8612	0.8091
*F-statistic**	221.52	18.31	96.70
Probability > F	0.0000	0.0000	0.0000
No. of observations	97	97	97

**Chi^2 instead of F-statistic for IV estimation.*
OLS: Robust standard errors. FE: Clustered Standard Errors.
T-statistics in parentheses.

Table 5. Performance equation.
Dependent Variable: Log-odds League Position {ln((45-League Position)/League Position)}

	OLS	Fixed Effects	IV Fixed Effects
Log Relative Wages	1.3345 (7.84)	1.7495 (5.23)	0.9842 (1.04)
Log-odds League Position (-1)	0.01112 (0.13)	-0.0416 (-0.24)	0.8597 (0.93)
Win Percentage	0.0597 (4.20)	0.0488 (2.29)	0.0802 (1.79)
Health of the League	0.3714 (2.75)	0.1911 (1.14)	-0.2637 (-0.47)
Log Relative Transfer Fees	-0.0963 (-2.15)	-0.0561 (-0.94)	-0.0174 (-0.13)
Goals Scored	-0.0273 (-3.44)	-0.0271 (-2.36)	-0.0481 (-1.63)
Goals Conceded	-0.0057 (-0.53)	-0.0130 (-0.76)	-0.0067 (-0.29)
Constant (a)	-0.8453 (-1.10)	0.5319 (0.47)	0.9481 (0.54)
Instruments	No	No	Win (-1)
R^2	0.8325	0.8173	0.7257
*F-statistic**	55.10	9.24	42.24
Probability > F	0.0000	0.0000	0.0000
No. of observations	81	81	81

**Chi^2 instead of F-statistic for IV estimation.*
OLS: Robust standard errors. FE: Clustered Standard Errors.
T-statistics in parentheses.

3. Removal of Lags.

Table 6. Revenue equation.
Dependent Variable: Log Relative Turnover {Turnover/ Avg. Turnover}.

	OLS	Fixed Effects
Log-odds League Position	0.2485 (7.36)	0.2272 (5.99)
Average Attendance	0.0431 (9.08)	0.0148 (2.08)
City Population	Negligible	Negligible
UK Q4 GDP Growth	0.1303 (2.27)	0.0600 (1.21)
Constant (α)	-1.8311 (-8.96)	-0.9282 (-4.72)
Instruments	No	No
R^2	0.8621	0.8324
F-statistic	222.43	15.63
Probability > F	0.0000	0.0000
No. of observations	165	165

OLS: Robust standard errors. FE: Clustered standard errors.
T-statistics in parentheses.

Table 7. Performance equation.
Dependent Variable: Log-odds League Position {ln((45-League Position)/League Position)}

	OLS	Fixed Effects
Log Relative Wages	1.2761 (12.55)	1.5506 (6.70)
Win Percentage	0.0656 (5.77)	0.0422 (3.36)
Health of the League	0.4250 (3.49)	0.3145 (2.56)
Log Relative Transfer Fees	-0.0477 (-1.09)	-0.0754 (-1.35)
Goals Scored	-0.0285 (-4.24)	-0.0200 (-2.17)
Goals Conceded	-0.0063 (-0.74)	-0.0239 (-2.22)
Constant (a)	-1.0897 (-1.58)	0.5711 (0.79)
Instruments	No	No
R^2	0.8433	0.8322
F-statistic	90.11	22.96
Probability > F	0.0000	0.0000
No. of observations	116	116

OLS: Robust standard errors. FE: Clustered standard errors.
T-statistics in parentheses.

Table 8. Wald test of joint significance: Performance equation (Goals scored and goals conceded).

	F-statistic	Probability > F
Goals scored & conceded	15.83	0.0000

H_0: Parameters are equal to zero.
H_1: Parameters are non-zero.

Performance equation (Goals scored & conceded): Reject H_0.

Individual Fixed-effects

1. Individual Fixed-effects: Teams with 4 seasons.

Table 9. Individual Fixed-effects for teams with 4 seasons of data.

Team*	Revenue equation	Performance equation
Manchester United	0.7476	1.4442
Arsenal	0.9054	0.8994
Chelsea	1.0215	1.0538
Liverpool	0.8079	1.1813
Everton	0.9793	1.2910
Newcastle United	0.6706	1.1756
Aston Villa	1.0359	0.9650
Tottenham Hotspur	1.2123	0.9974
Middlesbrough	0.8417	0.8764
Blackburn Rovers	0.9647	1.1640
West Ham United	1.1558	0.8398
Southampton	0.8332	1.3374
Leeds United	0.9811	1.0056
Charlton Athletic	0.8144	0.5121
Bolton Wanderers	0.9433	1.2166
Sunderland	0.7043	0.4905
Birmingham City	0.8071	0.7652
Derby County	0.6248	0.8917
Leicester City	0.6031	0.9796
Nottingham Forest	0.8417	0.8764
West Bromwich Albion	0.7768	1.6800
Ipswich Town	0.5408	1.0670
Sheffield United	0.4323	1.2658
Crystal Palace	0.5905	1.1179
Coventry City	0.8304	1.0446
Norwich City	0.5113	1.2596
Portsmouth	0.7069	0.7315
Wolverhampton Wanderers	0.7910	0.7437
Watford	0.5553	0.7666

**With full dataset of 4 seasons.*

2. Individual Fixed-effects: Teams with less than 4 seasons.

Table 10. Individual Fixed-effects for teams with less than 4 seasons of data.

Team*	Revenue equation	Performance equation
Manchester City	0.7798	1.0682
Fulham	1.2717	0.8132
Wimbledon	0.7285	1.9088
Sheffield Wednesday	0.6512	0.9518
Preston North End	-0.0003	1.9736
Huddersfield Town	0.2577	1.8503
Reading	0.4764	0.8126
Queen's Park Rangers	0.6821	0.2346
Barnsley	0.3643	1.4493
Stoke City	0.3212	1.0405
Millwall	0.7910	0.7437
Tranmere Rovers	0.1900	1.6034
Burnley	0.4520	1.4342
Port Vale	0.3004	0.8666
Gillingham	0.5703	1.3472
Grimsby Town	0.2471	0.8331
Crewe Alexandra	-0.1237	1.9591
Brighton & Hove Albion	0.3982	0.9507

**With dataset of 2/3 seasons.*

Tests of Final Regressions

Table 11. Hausman Specification test for fixed and random effects models.

	Chi- squared	**Probability > Chi- squared**
Revenue equation	35.26	0.0000
Performance equation	8.93	0.1120

H_0: Difference in coefficients is not systematic.
H_1: Difference in coefficients is systematic.

Revenue equation: Reject H_0.
Performance equation: Do not reject H_0.

The result shows that for the performance equation there is no significant correlation between the unobserved team- specific random effects and the regressors; therefore, a random-effects model may be preferable. However, I am specifically interested in the individual effects of each team, therefore fixed-effects is used.

Table 12. Ramsey RESET test for omitted relevant variables: OLS model.

	F-statistic	**Probability > F**
Revenue equation	8.19	0.0000
Performance equation	1.83	0.1432

H_0: No omitted relevant variables.
H_1: Omitted relevant variables.

Revenue equation: Reject H_0.
Performance equation: Do not reject H_0.

The revenue equation shows strong omitted variable bias, but this is due to the exclusion of the lag for aforementioned reasons; the effect of its inclusion is evidenced in Table 3 of the appendix. The performance equation value suggests there is no very significant regressor excluded, even without the lag, indicating my final model is improved from the theory.

Table 13. Wald test of joint significance: Fixed-effects model.

	F-statistic	**Probability > F**
Revenue equation	19.76	0.0000
Performance Equation	23.42	0.0000

H_0: Parameters are equal to zero.
H_1: Parameters are non-zero.

Revenue equation: Reject H_0.
Performance equation: Reject H_0.

5.2 MATHEMATICAL APPENDIX

Calculation of Szymanski & Garcia-del-Barro profit function:

$$\ln\left(\frac{R_{it}}{\overline{R}_t}\right) = \alpha + \beta_i + \gamma \ln\left(\frac{45 - P_{it}}{P_{it}}\right)$$

$$\left(\frac{R_{it}}{\overline{R}_t}\right) = e^{\alpha + \beta_i + \gamma \ln\left(\frac{45 - P_{it}}{P_{it}}\right)}$$

$$\left(\frac{R_{it}}{\overline{R}_t}\right) = e^{\alpha + \beta_i} e^{\gamma \ln\left(\frac{45 - P_{it}}{P_{it}}\right)}$$

$$\left(\frac{R_{it}}{\overline{R}_t}\right) = e^{\alpha + \beta_i} e^{\ln\left(\frac{45 - P_{it}}{P_{it}}\right)^{\gamma}}$$

$$\left(\frac{R_{it}}{\overline{R}_t}\right) = e^{\alpha + \beta_i}\left(\frac{45 - P_{it}}{P_{it}}\right)$$

$$R_{it} = \overline{R}_t\left(\frac{45 - P_{it}}{P_{it}}\right)e^{\alpha + \beta_i}$$

$$\ln\left(\frac{45 - P_{it}}{P_{it}}\right) = a + b_i + c\ln\left(\frac{W_{it}}{\overline{W}_t}\right)$$

$$\frac{1}{c}\ln\left(\frac{45 - P_{it}}{P_{it}}\right) = \frac{a + b_i}{c} + \ln\left(\frac{W_{it}}{\overline{W}_t}\right)$$

$$\left(\frac{45 - P_{it}}{P_{it}}\right)^{\frac{1}{c}} = e^{\frac{a + b_i}{c} + \ln\left(\frac{W_{it}}{\overline{W}_t}\right)}$$

$$\left(\frac{45 - P_{it}}{P_{it}}\right)^{\frac{1}{c}} = e^{\frac{a + b_i}{c}} e^{\ln\left(\frac{W_{it}}{\overline{W}_t}\right)}$$

$$\left(\frac{45 - P_{it}}{P_{it}}\right)^{\frac{1}{c}} = e^{\frac{a + b_i}{c}}\left(\frac{W_{it}}{\overline{W}_t}\right)$$

$$W_{it} = \overline{W}_t\left(\frac{45 - P_{it}}{P_{it}}\right)^{\frac{1}{c}} e^{-\frac{a + b_i}{c}}$$

$$\pi(P_{it}) = R_{it} - W_{it} = \overline{R}_t\left(\frac{45 - P_{it}}{P_{it}}\right)^{\gamma} e^{\alpha + \beta_i} - \overline{W}_t\left(\frac{45 - P_{it}}{P_{it}}\right)^{\frac{1}{c}} e^{-\frac{a + b_i}{c}} - F + I$$

Section 6: Bibliography

6 BIBLIOGRAPHY

Journals

Alchian A. (1950), "Uncertainty, evolution and economic theory." *Journal of Political Economy*, Vol. 58, pp 211-221.

Dutta P.K. & Radner R. (1999), "Profit Maximisation and the Market Selection Hypothesis." *Review of Economic Studies*, Vol. 66, No. 4, pp. 769-798.

Friedman M. (1953), "The Methodology of Positive Economics." *Essays in Positive Economics,* pp. 3-43.

Garcia-del-Barrio P. & Szymanski S. (2009), "Goal! Profit Maximisation & Win Maximisation in Soccer." *Review of Industrial Organization*, Vol. 34, No. 1, pp. 45-68.

Kesenne S. & Pauwels W. (2006), "Club Objectives & Ticket Pricing in Professional Team Sports." *Eastern Economic Journal*, Volume 32, Issue 3, pp. 549-560.

Neale W.C. (1964), "The Peculiar Economics of Professional Sports." *The Quarterly Journal of Economics*, Volume 78, No.1, pp. 1-14.

Rottenberg S. (1956), "The Baseball Players' Labor Market." *Journal of Political Economy*, Vol. 64, pp. 242.

Sloane P.J. (1971), "The Economics of Professional Football: the Football Club as a Utility Maximiser." *Scottish Journal of Political Economy*, Volume 18, Issue 2, pp. 121-146.

Reports

Deloitte & Touche (1997), "Deloitte Annual Review of Football Finance 1997," Issue 6.

Deloitte & Touche (2000), "Deloitte Annual Review of Football Finance 2000," Issue 9.

Deloitte & Touche (2004), "Deloitte Annual Review of Football Finance 2004," Issue 13.

Deloitte & Touche (2006), "Deloitte Annual Review of Football Finance 2006," Issue 15.

Deloitte & Touche (2009), "Deloitte Annual Review of Football Finance 2009," Issue 18.

UEFA (2010), "The European Footballing Landscape".

Websites

Talk Football (2007), "www.talkfootball.co.uk/guides/football_major_comps.html".

The Guardian (2009), "www.guardian.co.uk/football/2009/jun/02/premier-league-clubs-debt".

The Telegraph (2010), "http://www.telegraph.co.uk/sport/football/leagues/premierleague/7306680/Premier-League-debt-is-56-per-cent-of-total-across-Europe-says-Uefa-report.html".