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Regulatory Own Goals: The Unintended Consequences of Financial Regulation in Professional Football

By *Rónán Gallagher and Barry Quinn*

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Abstract

In 2010 the governing body of European football, UEFA, approved “Financial Fair Play” (FFP) regulations designed to encourage financial discipline, promote stability and foster competitive balance amongst the clubs that compete in European competitions. At the domestic level, several leagues have adopted variants of the FFP regulations with a financial break-even measure at their core. We examine the impact of the break-even constraints of varying severity on the joint financial and sporting efficiency of English professional football clubs. We argue that that whilst the FFP regulations heighten the relative importance of financial outputs over sporting, overall they serve to reduce club efficiency. As the degree of break-even regulatory severity increases the average club becomes more inefficient and the spread of efficiency outcomes widen. We contend that this is an unintended consequence which serves to undermine competitive intensity and which runs counter to stated regulatory goals.

Introduction

Association Football is the world's most popular spectator sport (Goldblatt, 2008). From traditional strongholds in Europe and South America popularity has spread globally over the last decade, particularly in Asia (Liu, Zhang, & Desbordes, 2017) and North America (Nalbantis & Pawlowski, 2016).

Widening access to a global audience has helped drive revenue growth. In the 2015/16 season European clubs were estimated to have generated almost €25bn[1] from a combination of broadcast, sponsorship and other commercial sources (Deloitte, 2017). However the aggregation belies an unequal distribution across nations and clubs therein. The top 20 clubs account for nearly 30% of European football revenue, 19 of whom come from the quintet of England (the Premier League), Germany (The Bundesliga), Spain (La Liga), France (Ligue 1) and Italy (Serie A).

An examination of club finance shows that a considerable portion are loss making and a sizeable minority are effectively insolvent, kept in business only by equity injections from wealthy owners (Franck, 2014).

In 2009 the former UEFA (Union of European Football Associations) president Michel Platini stated:

"Fifty per cent of [European] clubs are losing money and this is an increasing trend. We need to stop this downward spiral".

It was against this backdrop of widespread financial distress amongst clubs throughout its member nations that UEFA, in 2010, approved the Financial Fair Play (FFP) regulations. Amongst the stated objectives were[2]:

- to further promote and continuously improve the standard of all aspects of football in Europe
- to introduce more discipline and rationality in club football finances [by] encouraging clubs to operate on the basis of their own revenues;
- to place the necessary importance on the protection of creditors
- to protect the long-term viability and sustainability of European club football.

At the core of the FFP regulations and subsequent domestic interpretations is a technical provision referred to as the "break-even requirement". The provision states that over a given

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1 https://www2.deloitte.com/uk/en/pages/sports-business-group/articles/annual-review-of-football-finance.html

2 https://www.uefa.com/MultimediaFiles/Download/Tech/uefaorg/General/01/80/54/10/1805410_DOWNLOAD.pdf

assessment period clubs must stay within certain thresholds from break-even (calculated after subtracting "relevant"[3] expenses from relevant revenues). The break-even requirement set two thresholds for acceptable deviation. The first is the regular level of allowable loss and the second is the maximum level of allowable loss subject to a subsequent equity injection from owners to cover the excess over the regular level.

Violators of European sanctions can face a variety of censures from warnings to fines to bans from competing in European competition. Because the highest ranking teams in the top tiers of each nation go on to compete in European club competition, domestic leagues moved to ensure that those which qualify for the competitions in sporting terms also do so in financial terms and thus their regulatory frameworks have harmonised with FFP. In addition given that most domestic leagues operate in a multi-tiered format with promotion and relegation between the tiers, FFP influenced regulatory structures have also been implemented outside the top tiers.

The goal of our paper is to examine how break-even regulations impact club cost efficiency, and how this might vary under regulatory regimes of differing severity. In modelling club efficiency we seek to do so in a flexible manner. More specifically rather than looking at their financial efficiency (the ability to turn financial inputs into financial outputs at the lowest possible cost) or sporting efficiency (their ability to turn sporting inputs into sporting outputs at the lowest possible cost) in isolation we consider both objectives jointly. We argue that doing so has three central advantages:

1. It is consistent with observed club behaviour which asserts that neither sporting nor financial objectives are independent of one another

2. It facilitates the measurement of the opportunity cost of pursuing financial objectives *vis-à-vis* sporting objectives and vice versa

3. It is consistent with the overarching goals of the FFP regulations which at their core have financial provisions which are designed to improve the long term financial **and** sporting viability of the competitions they govern.

In order to incorporate these flexibilities in our modelling framework we turn to a novel methodology the Stochastic Nonparametric Envelopment of Data (StoNED) estimator which provides a unifying framework for two predominant frontier efficiency techniques - data envelopment analysis (DEA) and stochastic frontier analysis (SFA). The primary benefits of using this technique are that we do not have to impose a specific functional form on the cost function (i.e. we do not have to specify an explicit objective function ex ante) and that we can control for unobserved club productivity which if left untreated can lead to biased estimates

[3] Relevant income captures the primary sources of footballing revenue: receipts from the sale of broadcast rights, sponsorship, gate receipts, profits from player trading and other commercial activities. Relevant expenses include transfer expenditure, salaries and other operating costs. Notably expenses exclude items such as expenditure on youth development activities, women's football (from 2015), expenditure on community development and finance costs directly attributable to the construction of tangible fixed assets.

stemming from the endogenous feedback loop between revenue, player spending and sporting success.

We choose to focus our attention on the English Premier League and Championship, the top two tiers of the English Professional game from 2003 to 2014. We do so owing to the availability and comprehensiveness of financial statement data from UK Companies House and our data partner Deloitte. The aggregate revenues in the Premier League are by some considerable degree the largest of all professional football leagues (Deloitte 2017). Transitioning between the Premier League and Championship has enormous financial and sporting ramifications for promoted and relegated clubs and thus the inclusion of both tiers adds interesting heterogeneity to our sample.

We find that as the degree of break-even regulatory severity heightens the average club becomes less cost efficient and the distribution of efficiency outcomes widen. This implies that on average the regulation, rather than engendering cost efficiency actually decreases it and drives a larger efficiency wedge between clubs at the top and bottom of the efficiency distribution.

The models employed also reveal that as regulatory severity increases each unit of league revenue share captured comes at an increasing cost of league points share. On the other hand, each additional unit of league point share captured comes at a decreasing cost of revenue share. As such, it appears that break-even-based financial regulation raises the relative importance of financial outcomes, whilst simultaneously lowering the relative importance of sporting outcomes in determining overall club cost efficiency. We posit that this undermines the competitive intensity of the competitions to the detriment of the fan experience. This is an unintended consequence, which may run counter to the initial goals of the regulations.

The remainder of the paper is structured as follows. In section 2 we discuss in more detail the FFP regulations enforced by UEFA, the Premier League and the Championship. In section 3 we survey the most representative literature on the impact of FFP regulations on football clubs. Section 4 outlines the empirical methodology employed. Section 5 presents the data sources and definitions. Section 6 summarizes our main findings and section 7 concludes.

The FFP Regulations

The original guidance on UEFA's FFP regulations was published in 2010 with sanctions for noncompliance effective from the end of the 2013/14 season[4]. The break-even requirement states that clubs have an allowable deviation (loss) of €5m from break-even assessed over a three year rolling window. Subject to owner equity injections covering the excess loss, clubs were permitted to breach the €5m limit up to a maximum allowable loss level of €45m. This was subsequently revised down to €30m in the 2015/16 season. As well as the break-even requirement a second condition known as the payables requirement prohibits clubs from having overdue creditors.

It is important to note that for the purposes of FFP, break-even is defined in a slightly different manner to the common accounting method. For FFP, break-even is defined as relevant income minus relevant expenditure. Relevant income captures the primary sources of footballing revenue: gate receipts, broadcasting rights, sponsorship, advertising, other commercial activities plus profits from disposal of player registrations. The relevant expenditure category includes cost of sales, employee benefit expenses and other operating expenses, plus either amortisation or costs of acquiring player registrations, finance costs and dividends. Relevant expenses exclude items such as expenditure on youth development activities, women's football (from 2015), expenditure on community development and finance costs directly attributable to the construction of tangible fixed assets.

In February 2013 at the Premier League shareholders meeting, member clubs agreed a regulatory framework[5] similar in structure to UEFA's FFP regulations. Firstly, clubs were allowed to deviate from break-even (i.e. lose) £15m over a three year rolling window. Losses in excess of this amount up to a total loss of £105m were permitted subject to owner equity injection of the excess. In addition, to control for short run cost increases, clubs are limited in raising wage bills (inclusive of player image rights) by £4m per season unless they can demonstrate contemporaneous revenue uplift (excluding central distributions from the Premier League itself) to cover the balance.

In the Championship (the second tier of English professional football), beginning in 2012/13 clubs faced an acceptable deviation from break-even of £3m per year, or up to £8m if the excess was covered by owner equity injection. In the 2015/16 season the regulation further harmonised with the UEFA and Premier League by assessing over a three year rolling period rather than annually. Over this window clubs are permitted to lose £15m without a

[4] UEFA's Club Financial Control Panel made its first FFP assessments at the end of the 2013/14 season. Several high profile clubs were amongst those sanctioned. Manchester City and Paris St Germain (beneficiaries of significant investment from the UAE and Qatar respectively) were subject to fines, limits placed on transfer spending and reductions in permitted squad sizes for European competition. The Club Financial Control Panel also moved to withhold prize money and exclude from European competition several clubs accused of having overdue payables (e.g. FC Malaga and Bursaspor).

[5] By March 2014, clubs were required to submit financial information in compliance with the updated regulatory code. The first break-even decisions were will be taken at the end of the first three season year rolling window (in Summer 2016).

mandatory equity injection or up to £39m if equity is injected to cover the excess loss over £15m[6].

To summarise European and domestic FFP thresholds are currently set at the following levels:

TABLE 1

Financial Fair Play Loss Thresholds

Regulator	*Regular Allowable Loss*	*Maximum Allowable Loss*	*Assessment Period*
UEFA	€5m	€30m	3 rolling seasons
The Premier League	£15m	£105m	3 rolling seasons
The Championship	£15m	£39m	3 rolling seasons

[6] Given that losses are calculated on the basis of three year averages, clubs that have been relegated from the Premier League during the time period can use the maximum allowable Premier League loss (£105m/3=£35m a season including owner equity injection) for those seasons in which they played in the top flight.

Literature Review

Advocates of the FFP regulations argue that they have three primary benefits:

1. They incentivise financial discipline which discourages de-stabilising over-investment.

2. They harden the club's budget constraint in a manner which refocuses clubs on developing sustainable commercial partnerships and appointing skilled management.

3. They reduce the scope for 'financial doping' which enhances the integrity of the sporting competition

From a theoretical perspective, professional sports leagues are often modelled in the "rat race" framework introduced by Akerlof (1976). Clubs compete for mutually exclusive ranking and associated rank related revenue (Franck, 1995; Müller, Lammert, & Hovemann, 2012). Perceived "jackpot" financial outcomes from Champions League qualification and promotion to the Premier League incentivise over-investment in the form of transfer fees and salaries. (Müller et al., 2012) contend that FFP regulations limits over-investment, providing much needed discipline to the advantage of aggregate league profitability.

Franck (2014) asserts that many clubs are effectively insolvent and kept afloat solely by cash injections from wealthy benefactors. It is reasoned that this serves as a soft budget constraint for club management leading to suboptimal behaviour. Franck (2014) contends that the FFP regulations are as hard a budget constraint that UEFA (without insolvency law jurisdiction in its member nations) can implement. In addition it is claimed that a refocus towards financial sustainability encourages investment in young talent, incentivises the creation of new commercial partnerships, rewards skilled and disciplined management teams and is conducive to competitive intensity.

Franck and Lang (2013) present a theoretical model to analyse the adverse incentive effects of money injections by benefactors on the risk taking of clubs. They show that the presence of a benefactor induces football clubs to take on increasingly riskier investments. These risky investments can culminate in club bailouts which are more likely to come from public than private sources. The authors opine that some clubs may be deemed "too big to fail" due to their market size being sufficiently large enough to always make it optimal from a welfare perspective to be bailed out. The authors moreover present a model which demonstrates that the FFP regulations are welfare enhancing for clubs which are risk seeking (but welfare destroying for those which are risk averse). Owing to the persistent losses and widespread instances of negative equity reported by in club finances in 2010 the authors conclude that clubs are risk seeking and thus the need for the FFP regulations is well founded. Muller et al. (2012) commenting on excessive owner equity injection equates the practice to medical doping. They argue that that such behaviour is a form of "financial doping" that undermines

league integrity and in turn can adversely affect the sport's popularity and viability.

Critics of the FFP regulations argue that they:

1. Protect powerful elite clubs from "sugar daddy" (benefactor) funded disruptive competitors which fossilises league structure and presents a barrier to entry to elite European competition

2. Reduce investment in the European game to the detriment of fan experience

3. Transfer economic rents from players to club owners in a potential unlawful manner

4. Are an inefficient means of wage reduction when compared to a US style salary cap

5. Leave scope for regulatory arbitrage resulting in excessive costs of enforcement

Maxcy (2014)notes that the introduction of the FFP break-even requirement moves open European leagues (with promotion and relegation) to an operational model more akin to the US closed league system (with significant barriers to entry and success strata within leagues). Sass (2012) and Szymanski (2015) note that club revenue and playing success go hand in hand. Sass (2012) asserts that the size of a club's potential market is not exogenously determined but rather a function of historical success. It is argued that while the FFP break-even regulations may serve to reduce the impact of "sugar daddy" owners, competitive balance overall is actually undermined via the dominance of the large clubs who are protected by the FFP regulations.

Szymanski (2014) questions whether the impact of sugar daddy owners and perceived competitive imbalance has been bad for European football in aggregate. It is noted that the size of that commercial deals, attendance and global attention on the European game have increased significantly over a period in which financial and competitive inequality at clubs has risen. Moreover, the assertion that sugar daddy finance is an unsustainable source of funds for clubs is challenged with the author pointing out that the number and variety of wealthy benefactors continues to rise over time. The implication is that by restricting the injection of equity to clubs by such benefactors, this leads to declining investment in playing talent to the detriment of the fan experience.

Madden (2012) presents a theoretical model of the welfare implications of sugar daddy (benefactor) investment. Benefactor owners are willing to inject their own funds into a club in order to increase playing quality. On the other hand, some clubs are organised such that they are win maximisers subject to financial break even, but the owners will not inject further funds to improve sporting outcomes. Under the assumption of relatively elastic supply of footballing talent (motivated by global competition for players), the imposition of FFP reduces the overall quality of the league, player wages and fan and owner utility. The author contends that from a consumer surplus criterion, the FFP regulations should be tempered.

Several critics including Budzinki (2014) and Szymanski (2014) document that the FFP regulations in their current form represent a transfer of economic rents from players to club owners. Revenue related caps on player expenditure serve to reduce the market clearing price of playing talent. In a league where teams compete for mutually exclusive ranking in addition to one where expenditure on playing talent and playing success are closely linked, the regulations serve to reduce the cost of buying a status related finishing position. The beneficiaries of this are club owners, most prominently those of the highest status clubs with the largest wage bills. Peeters & Szymanski (2012) compare the impact of the FFP break-even requirement in reducing wages to that of a US style league wide salary cap. Competitive balance in the league improves only slightly and would be significantly higher given the introduction of a US-style salary cap[7].

Vöpel (2011) identifies the cost of FFP regulation monitoring to be a significant concern to their effective implementation. The FFP regulations class certain forms of income and expenditure as "relevant" in the break-even calculation. This form of classification shifting may induce creative accounting practices that have the potential to undermine the goals of FFP (Budzinski, 2014). The monitoring of related party transactions (whereby a significant commercial partner is closely related to the club owner) require detailed scrutiny to assess whether commercial deals are signed at "fair market value". It has also been observed that the initial response to FFP from some clubs has been to engage in regulatory arbitrage schemes[8]. If the FFP regulations are to be seen as credible, attempts to engage in these schemes should be monitored closely, and those who flaunt the regulations sanctioned appropriately.

Budzinski (2014) asserts that some of the criticisms of FFP may be partially mitigated by reform to the FFP structure. It is noted that whilst the "no overdue payables" rule is rooted in financial stability, the break-even requirement brings with it a swathe of unintended consequences. The author proposes alternative formulations: from the radical dropping of the break-even requirement to the more moderate expansion of classes of allowable revenue and / or permitting unlimited owner equity injection.

[7] Peeters and Szymanski (2012) note that US salary caps emerge from a collective bargaining process between the key stakeholders and as such are exempt from antitrust regulation. In contrast FFP has not emerged as a result of collective bargaining and therefore its compliance with EU competition law is an important and debatable consideration.

[8] Such as intricate player transfers between closely affiliated clubs; the use of high profile loans as a means of avoiding balance sheet recognition and amortization charges and the creation of de facto youth player farms used in conjunction with the loan system to maximise the value realised from the trading of young players.

Empirical Methodology

Our empirical design benchmarks team performance using production frontier efficiency techniques. Team performance is measured relative to a 'best practice' frontier, which is derived from all other teams' ability to produce outputs by optimally allocating available resources. Such measures are superior to traditional techniques because they summarize many aspects of performance in a single statistic.

In the context of English football, efficiency analysis has been applied using two competing paradigms - Data Envelopment Analysis (DEA) (Barros & Leach, 2006a, 2006b; Guzmán & Morrow, 2007; Haas, 2003) and Stochastic Frontier Analysis (SFA) (Barros & Garcia-del-Barrio, 2008; Barros & Leach, 2007; Carmichael, McHale, & Thomas, 2011; Dawson, Dobson, & Gerrard, 2000b; Gerrard, 2005).

DEA is an axiomatic mathematical programming technique which imposes no functional form on the frontier and distribution of inefficiency (Charnes, Cooper, & Rhodes, 1978; Farrell, 1957). SFA is an parametric regression based approach which requires an ex ante specification of a frontier's functional form and the inefficiency distribution(Aigner, Lovell, & Schmidt, 1977; Meeusen & van den Broeck, 1977). While usually viewed as direct competitors these two approaches can in fact be complementary, where the choice entails a tradeoff. DEA sacrifices the modeling of noise for the ability to impose axiomatic properties and estimate the frontier non-parametrically. SFA sacrifices the imposing of axiomatic properties for the benefit of modelling inefficiency and noise (Johnson & Kuosmanen, 2015).

Recent literature has led to the full integration of DEA and SFA into a unified framework referred to as *Stochastic Nonparametric Envelopment of Data* (StoNED) (Kuosmanen, 2008; Kuosmanen & Johnson, 2009; Kuosmanen & Kortelainen, 2012). This study is the first to apply this more flexible approach to investigate the unintended consequences of financial regulation.

The Model

Neoclassical theories of the firm[9] are inadequate for understanding the economic behaviour of football teams where success is measured in both sporting and financial terms. Evidence is mixed regarding the relative importance of these dimensions in modelling performance. Garcia-del-Barrio and Szymanski (2009) have shown that football can be characterised as win maximising, subject to a zero profit budgeting constraint, but emphasize that this finding

[9] Consideration of a sports team as an economic entity poses some unique challenges to modeling production (Neale, 1964). (Sloane, 1971) argued that profit maximisation should be replaced with the maximisation of a utility function that could conceivably include, fan loyalty, playing success, media recognition and sponsorship as well as profit. Profit and or wealth maximisation objectives are consistent for most other global team sport franchise which consistently return large profits (for example American professional team sports). The profitability of these franchises can to some extent be linked to their closed league system, cooperative labour restraints (salary caps) and the fact that on-field competition is only a small part of a bigger business enterprise.

may be an artefact of the period of investigation[10]. Carmichael and Thomas (2014) argue that top flight teams primarily strive for league survival and then a dominant domestic league position. The former enables continuing receipt of significant broadcasting revenue, while the latter provides access to lucrative continental club competition revenue. Peeters and Szymanski (2014) opine that football is a heterogeneous mix of wealth and win maximising motives. By utilising the StoNED approach, no ex ante specification of the combination of these motives is required, allowing the data to provide answers as to their relative importance and how this importance changes with the imposition of FFP regulation.

Football teams compete for on-field success but can cooperate for off-field (financial) success (Garcia-del-Barrio and Szymanski, 2009), with competition characterising on-field success as a zero-sum game (one team wins and one loses, or there is a draw). These unique aspects of production in sports were first captured by Tullock (1980) using a model where playing success is driven by the relative share of resources employed. Our model extends this share approach to modelling team production by allowing the inputs and output to enter the model as share variables per season and league tier. This empirical design will provide key insights into the competitive balance motivations of the FFP regulation as well as how teams capture and maintain market share (Carmichael et al., 2011).

Team production is modelled using an intertemporal cost function:

$$c_{it} = C\left(y_{1it}, y_{2it}, w_{it}\right) \times h\left(z_{it}\right) \times \exp(\epsilon_{it}) \quad i = 1, \ldots, I;\ t = 1, \ldots, T \quad (1)$$

The cost function defines the minimum cost for providing outputs y_1 and y_2, where c_{it} is the total variable cost of club i in season t, C(.) is a non-parametric cost function, h(.) is a parametric operating environment function, and $\varepsilon_{it} = u_{it} + v_{it}$, a composite error term that combines inefficiency (u_{it}) and noise (v_{it}). The model is intertemporal in that the non-parametric cost function C(.) is applied over all seasons in the panel (Tulkens and Vanden Eeckaut, 1995). The z_{it} vector controls for the operating environment of the club and is also used to impose hypothetical retrospective[11] financial fair play regulatory conditions.

Importantly, no functional form is imposed on C(.); rather a more relaxed set of axiomatic assumptions are used which assume C is monotonic (increasing in all y), convex (diminishing marginal rates of substitution), and exhibits constant returns to scale (this latter assumption is tested and results are available upon request from the authors). We estimate equation 2 by solving the following:

[10] The period of investigation was one where intense competition for broadcasting and media exposure meant clubs where achieving a dominant sporting position to achieve higher profits in the longer term.

[11] There is a body of literature which argues for the importance of retrospective economic analysis of regulation (Arrow et al., 1996; Lutter, 2013). This literature emphasises that policy makers can glean counterfactual inferences from retrospective cost-benefit analysis on proposed regulation. This approach is also used in the banking efficiency literature to investigate the counterfactual opportunity cost of regulatory compliance (Glass, McKillop, & Rasaratnam, 2010) By extending this approach to football we can illuminate retrospective changes in the optimal behaviour of a club due to financial regulation.

$$\underset{\gamma\beta\theta\tilde{\varepsilon}}{Min} \sum_{I}^{i=1} \sum_{T}^{t=1} \tilde{\varepsilon}_{i,t}^{2}$$

subject to:

$$lnc_{i,t} = ln(\alpha_{i,t} + \beta_{i,t} y_{i,t} + \theta_{i,t} w_{i,t}) + \gamma z_{i,t} + \tilde{\varepsilon_{i,t}} \quad i = 1, ..., I \quad t = 1, ..., T$$

$$\alpha_{i,t} + \beta_{i,t} y_{i,t} + \theta_{i,t} w_{i,t} \geq \alpha_{j,k} + \beta_{j,k} y_{i,t} + \theta_{j,k} w_{i,t} \quad i, j = 1, ..., I \quad t, k = 1, ..., T$$

$$\beta_{i,t} \geq 0 \quad i = 1, ..., I \quad t = 1, ..., T$$

$$\theta_{i,t} \geq 0 \quad i = 1, ..., I \quad t = 1, ..., T \quad (2)$$

This is a least squares regression written as a nonlinear mathematical programming problem. The first equality allows for the shadow price estimates (β_{it},θ_{it}) to vary across both club and season. These parameters characterise the tangential planes of the cost function. Estimated α, β and θ coefficients create a piece-wise linear cost function which will provide a consistent estimate of $E(C|y, w)$ (Lim & Glynn, 2012; Seijo & Sen, 2011).

In duality theory it has been well established that the cost function is an equally valid production technology representation as the conventional production function, or a distance function (e,g., Fare and Primont ,2012). Importantly, the use of a cost function does not necessarily require or imply cost minimisation. In fact, the above duality theory requires no a priori behavioural assumption thus allowing our model to fully capture the heterogeneous mix of English football team performance objectives (Eskelinen and Kuosmanen 2013).

A further challenge in modelling club performance is the endogenous feedback loop between revenue, player spending and sporting success (Garcia-del-Barrio and Szymanski, 2009; Leach and Szymanski, 2015; Szymanski and Smith, 1997). Hall et al. (2002) argue causation runs from wages to success in the English Premier teams. In contrast, Dobson and Goddard (1998) find lagged revenue cause current performance for Football League teams. This dependence was much more pronounced in smaller clubs than large, suggesting that a small group of wealthy clubs dominate sporting success. Peeters and Szymanski (2014) control for unobserved player productivity using both an instrumental variable and a club-specific fixed effect approach in their parametric contest function. They further consider the feedback effects from the contest results on wage spending by using a two-stage instrumental variables estimator.

Our empirical design provides sufficient flexibility to accommodate these endogeneity issues and provide valid estimates. Specifically, we appeal to the panel data solution for the simultaneity problem in production function estimation first proposed by (Mundlak, 1961; Mundlak & Hoch, 1965). Our model extends this approach by providing nonparametric time-varying club specific effect estimates α_{it}[12]. These 'catch all' estimates will provide a channel through which unobserved productivity can be controlled. Furthermore, if we can assume that feedback effect from wages to success has a constant variation across club's and seasons, then these club-specific time varying estimates will capture the unobservable nature of the feedback relationship.

[12] A variable returns to scale specification is used to estimate these effects.

Modelling the Operating Environment.

The z vector includes variables that capture both the cross club heterogeneity and the temporal changes over the seasonal period 2003-2004 to 2013-2014.

The vector includes dummy variables that control for Champions League and Europa league qualification[13]. Deloitte (2013) identify on-field performance as a key revenue driver for both domestic and the more lucrative European competitions.

Two dummy variables are included to capture the implications of promotion and relegation; *Promo* identifies a club in its promotional push year (i.e the year immediately preceding promotion to the Premier League), while *Releg* identifies a club relegated from the Premier League in the prior season. Goddard (2014) contends the opening of competition through the promotion and relegation system creates large disparities between the operating environments of the two tiers. He argues this system has a detrimental effect on profitability, owing to the pervasive tendency to overspend in an effort to achieve promotion or avoid relegation. He points to the two tier system in English football as a case in point, where promoted teams fail to survive in the Premier league for more than one season, while relegated teams commonly experience financial distress upon arrival in the Championship. Finally, a set of season-tier dummies are included to capture unobservable temporal effects.

Akin to the literature on retrospective economic analysis of regulation (Arrow et al., 1996; Glass, McKillop, & Rasaratnam, 2010; Lutter, 2013) the hypothetical financial regulation conditions are imposed within the z vector. Following Peeters and Szymanski (2014) we impose the FFP break-even constraint at the £15m, £10m, £5m and £5m over three seasons threshold. Each threshold is calibrated using pre-tax profits in each season, and dummy variables are created equating to one if the club's pre-tax losses are less than the threshold value and zero otherwise.

As well as controlling for the operating environment, the γ coefficient estimates from equation 2 can provide intuitive economic meaning. The StoNED estimator is a form of regression and as such marginal effects can be extracted. Specifically, the equality constraint from equation 2 can be rewritten as follows:

$$\gamma z + \varepsilon = ln(C) - ln(f(y,w))$$
$$\gamma z + \varepsilon = ln(C/f(y,w)) \quad (3)$$

where the right hand side can now be interpreted as the log of cost inefficiency (actual cost/ideal minimum cost). Thus, the coefficient estimates for the z variables can be interpreted as the marginal effects of the z variables on the log of cost inefficiency.

[13] Carmichael et al. (2011) include dummies for teams who qualified for these competitions in each season as they argue that this is an important revenue generating goal for English football teams.

To attach economic meaning to these marginal effects in our log-linear model the estimates must first be exponentiated. Furthermore, if the z variable is binary the exponentiated estimate corresponds to the ratio of the expected geometric means of the unlogged outcome variable for the two coded groups. This can be interpreted as the percent change of the geometric mean when switching between groups. For example, if the coefficient estimate of the promotional push variable equals 0.05, then there would be an expected increase in the geometric mean of a club's cost inefficiency of 5.1% (exp(0.05)=1.051) due to promotion[14].

Data and Shadow Price Testing

Financial statement data for both Premier League and Championship teams is sourced from the Deloitte annual reviews of football finance. The financial data is augmented with sporting performance data sourced from the Premier and Football Leagues' websites. The data is extracted from the annual financial statements of the legal entity registered in the UK which is at, or closest to, the top of the ownership structure of the club. The data has then been adjusted to provide a clearer picture of the football business of the club by extracting, where available, financial activities or significant capital transactions relating to non-football activities. The full sample is an unbalanced panel representing 54 clubs spanning the 2003/2004 to 2013/2014 seasons. In total, we have 443 club-season observations (see appendix table x for full details of clubs included in each season).

Inputs and Outputs

The main input factor, C, is the variable cost share of the club where cost is measured as the total of salaries, amortisation of player registrations[15] and match day expenses. Financial output is modelled as a club's revenue share, y_1. Revenue includes that generated from broadcasting, matchday and commercial activities. Broadcast revenue includes both domestic and international competitions capturing the financial success of playing in Europe. Matchday revenue is largely derived from gate receipts. Commercial revenue includes sponsorship, conference and catering, merchandising, licensing and other revenues. Sporting output is modelled as a club's domestic point share, y_2. When assessing team efficiency it is important to consider the variation in the talent available (Dawson, Dobson, & Gerrard, 2000a), thus a variable input price, w, is included to capture the variation in playing talent available to management. This is measured as net book value share of the playing squad[16]. Inclusion of a playing input price can significantly improve the estimation of a club's cost function given the variation in playing talent in the English game. Tables 2 presents a snapshot of the financial data over the sample period.

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[14] This interpretation can be extended to other z dummy variables without the need to use the 'holding all else at some arbitrary fixed value' interpretation. This is because while the expected geometric means for each group will differ for different values of the other variables, their ratio will remain constant.

[15] Accounting standard dictate that the cost of acquiring a player's registration from another club should be capitalised on the balance sheet within intangible fixed assets. Generally, the capitalised amount is subsequently amortised over the period of player's contract. The potential value of 'home grown' players is excluded from intangible fixed assets as their is no purchase costs (Deloitte, 2015)

[16] An alternative labour price specification, NBV of playing squad divided by number of over 18 players, was also used in the analysis calculated at the league share level. This specification revealed very similar results to those presented in section 6 confirming that our more stylised measure of playing squad share captures price input variable in our sample.

TABLE 2

Summary Statistics for Financial Data

Revenue(£000)							
Season End	*League*	*Mean*	*Median*	*StdDev*	*Min*	*Max*	*Count*
2004	Premier	67038	48763	38489	37980	171500	19
2009	Premier	101126	76863	69247	46927	278476	19
2014	Premier	162973	108674	106946	83138	433164	20
2004	Championship	12732	9434	8547	4119	35112	19
2009	Championship	16385	12074	8579	6831	32557	21
2014	Championship	21047	19384	10045	8531	39321	21
Costs(£000)							
2004	Premier	54641	44514	35705	25216	170716	19
2009	Premier	95710	71796	51964	39138	228563	19
2014	Premier	137006	96000	90962	53754	375115	20
2004	Championship	10362	8564	6261	2851	28489	19
2009	Championship	18481	15656	9509	6334	39597	21
2014	Championship	26979	20838	20005	7622	95391	21
Net Book Value of Player Registrations (£000)							
2004	Premier	28686	17754	36022	783	153236	19
2009	Premier	54472	39378	41542	3706	131788	19
2014	Premier	69440	37728	70406	8420	225898	20
2004	Championship	2040	965	2525	133	8772	19
2009	Championship	4225	3212	4477	9	20207	21
2014	Championship	3866	3221	5048	205	23751	21

A Note on Shadow Prices

A key focus of our study is to understand the juxtaposition of a team's sporting and financial objectives, and how these objectives are affected by the imposition of various levels of regulatory stringency. In our model we investigate these phenomena using shadow prices.

Shadow prices have been defined as 'virtual' or 'implicit' in the industrial organisation literature (Färe and Primont, 2012). They are the value of the marginal product faced by the decision maker based on the optimal choice of outputs and inputs which maximises utility (Murray, 1995). If the team's choices of input-output bundles are guided by rational economic objectives, these shadow prices reveal[17] the underlying opportunity costs hidden

[17] This is in the spirit of the revealed preference theory of Samuelson (1948).

from the researcher (Kuosmanen et al., 2006)[18]. Importantly, this opportunity cost (economic price) definition can also be interpreted as marginal substitution (transformation) rates between inputs (outputs). Given that our model uses unit-free share variables this offers an intuitive appealing interpretation of the shadow price estimates as opportunity costs. For example if the shadow price on revenue share is 0.5, to increase revenue share by 1%, 0.5% of points share must be sacrificed.

The nonparametric part of equation 1 provides shadow price estimates for our two outputs that are specific to each club in each season. Given variables enter the model in share form, the shadow prices highlight the economic importance to a rational manager/ownership of capturing market share in each variable and how this importance will change with increased financial regulation stringency. While shadow price estimation for non-market goods and services has a rich history using DEA, SFA and StoNED methods (see Färe & Grosskopf, 1990; Färe, Grosskopf, C. A. Knox Lovell, & Yaisawarng, 1993; Kuosmanen, 2013; Kuosmanen, Kortelainen, Sipiläinen, & Cherchye, 2010; Kuosmanen, Post, & Sipiläinen, 2004) it is extremely rare to see standard errors reported.

[18] The divergence of shadow prices from actual prices can be attributed to various market constraints including monopoly and monopsony power, sticky prices, as well as exogenous regulatory shocks (Färe & Primont, 2012).

Our Results

Given that the StoNED approach to cost function estimation relies on a sum of squares minimisation problem, a regression interpretation can be utilised. In a panel regression setting, Eskelinen & Kousmanen (2013) describe how a StoNED consistent fixed effects model can be employed. In the equation below we can measure periodic deviation from the efficient frontier as $exp(-\hat{\varepsilon}_{it}^{CNLS})$. This includes the inefficiency of interest in addition to stochastic noise. We take an average of this deviation over time with a goal of specifically distilling the inefficiency of a club over the sample period. Subsequently we can identify the most efficient club over the sample period and thus use this as a benchmark for all others. We do so by normalising the efficiency score as a percentage of benchmark club efficiency. Our measures, therefore, are bounded by 0 and 1. A club with a score of 1 is operating on the efficient cost frontier. A club with a score less than 1 can improve their efficiency by producing the same share of outputs at a lower share of costs.

$$\bar{d}_i = \frac{1}{T}\sum_{t=1}^{T} exp(-\hat{\varepsilon}_{it}^{CNLS})$$

$$\bar{d}_* = max(\bar{d}_i)$$

$$\widehat{effi} = \bar{d}_i / \bar{d}_* \text{ [19]}$$

As discussed in the prior section we analyse the efficiency implications under several break-even regulatory regimes hitherto listed in increasing order of regulatory severity:

1. No break-even regulations (labelled No FFP)
2. A maximum allowable loss of £15m (labelled BE15M)
3. A maximum allowable loss of £10m (labelled BE10M)
4. A maximum allowable loss of £5m (labelled BE5M)
5. A maximum allowable loss of £5m cumulatively over 3 seasons (labelled BE5M3S)

We impose these regulatory constraints on our cost efficiency model observing the hypothetical impact on club efficiency over the seasons 2003/2004 to 2013/2014 inclusive.

[19] Note that this approach can be sensitive to the unbalanced nature of the panel. For this reason we have reproduced these efficiency estimates using a balanced version of our sample. The results are broadly consistent with table 2 and are available upon request.

TABLE 3

*Descriptive statistics of cost efficiency scores**

Model	*Mean*	*Std Dev*	*Median*	*Min*	*Max*
No FFP	0.912	0.066	0.871	0.655	1
BE15M	0.899	0.069	0.849	0.644	1
BE10M	0.841	0.077	0.843	0.621	1
BE5M	0.823	0.091	0.841	0.602	1
BE5M3s	0.821	0.112	0.835	0.513	1

*A club with a score of 1 is operating on the efficient cost frontier.

Several noteworthy findings emerge in Table 3, which summarises efficiency by regulatory regime. Firstly, as the degree of break-even regulatory scrutiny becomes more severe the average club becomes relatively less efficient vis-à-vis the most efficient club. The cost efficiency gap between the mean (median) and most efficient club increases from around 7.8% (12.9%) under the no FFP model to 17.9% (16.5%) under the most stringent of regulatory regimes. The distribution of relative club cost efficiency (as measured by the standard deviation of efficiency scores) also widens significantly with increased levels of regulatory scrutiny.

Our methodology allows us to investigate the efficiency dynamics via output shadow price estimates. Shadow prices can be interpreted as marginal costs or alternatively as relative importance measures in determining overall cost efficiency. Using either interpretation, they allow us to look at the tradeoffs clubs face in pursuing financial and sporting goals in an efficient manner under various regulatory regimes. Table 4 presents the mean and median of these shadow prices.

TABLE 4

Summary of StoNED Shadow Prices

Model	*No FFP*	*£15M*	*£10M*	*£5M*	*£5M over 3 seasons*
			Mean		
Revenue Share	*0.427*	*0.439*	*0.445*	*0.471*	*0.503*
Points Share	*0.396*	*0.341*	*0.305*	*0.271*	*0.260*
			Medians		
Revenue Share	*0.473*	*0.482*	*0.501*	*0.512*	*0.581*
Points Share	*0.357*	*0.295*	*0.239*	*0.212*	*0.199*

The figure in each cell is calculated by averaging the 443 club-season StoNED shadow price estimates. The above table are the results of variable returns to scale model. The constant returns to scale model produced broadly similar results.

Several noteworthy findings emerge. As we increase break-even regulatory severity, the relative importance of capturing league revenue share increases. We see the mean (median) shadow price of revenue share rise from 0.427 (0.473) to 0.503 (0.581), meaning that each extra incremental percentage of league revenue share captured comes at an increasing cost of points share, from 0.427% (0.473%) in the non FFP regime to 0.503%

(0.5815) in the most stringent regime. We see an even more marked fall in the shadow price of points share. The mean (median) shadow price of points share falls from 0.396 (0.357) to 0.260 (0.199) meaning that each extra incremental percentage of points share captured comes at an decreasing cost of revenue share. Put simply as regulatory severity increases, revenue generation becomes more important for efficiency while points share (sporting success) becomes less important.

The StoNED model is a semi nonparametric specification which allows for shadow prices to differ across clubs and seasons but does not readily provide a standard error for statistical inference[20]. Following a novel procedure introduced by Gallagher, Kuousmanen & Quinn (2017)[21] we test the significance of differences in shadow prices across regulatory regimes using the output ratio and standard approaches to testing group difference. In each scenario we compare the base case (no imposition of FFP break-even regulation) to the various regulatory formulations. Table 5 shows the output of the tests for differences in the relative importance (as measured by the ratio of shadow prices) of revenue versus sporting outputs. These results provide statistical evidence to corroborate the average differences observed in table 4.

Firstly, we test the two ratio for normality using the Anderson and Darling (1952, 1954)[22] test. In all instances normality was rejected[23]. The first column of table 5 provides the results of an equality of variance test. Rejection of this test indicates that a Kolmogorov-Smirnov test will provide more robust statistical inference (Conover, 1999). The second and third column in table 5 provide the result of two non-parametric pairwise comparison tests.

TABLE 5

Group Comparison Statistical Tests for Shadow Prices

y1/y2	*Equality of Variance F-test*	*Wilcoxon Mann Whitney rank sum z-test*	*Kolmogorov-Smirnov equality of distribution D-test*
BE15M	244.807***	6.503***	0.34***
BE10M	271.126***	7.549***	0.346***
BE5M	150.141***	8.765***	0.375***
BE5M3s	178.761***	7.788***	0.35***

*** p<0.01; **p<0.05; *p<0.1

Proponents of the FFP regulations may contend that this refocusing of football clubs towards revenue generation indicates that the break-even requirements of FFP are achieving their intended outcomes. However, we would urge caution in making such an assertion. The

[20] Unlike in a parametric setting where such shadow prices are assumed to be constant across firms and a point estimate along with a standard error is usually tabulated for exposition and statistical inference.

[21] Simar & Wilson (2007) note that the estimated distance to frontier is serially correlated in a complex, unknown way. The same applies to shadow prices. Gallagher, Kuousmanen & Quinn (2017) show that a shadow price depends on both the curvature of the output isoquant and the output mix, which can be measured by the ratio of the outputs. Crucially they show that the shadow price is independent of the distance to the frontier so finite sample estimates do not suffer from the serial correlation issues.

[22] Anderson and Darling (1952, 1954) introduced a rank sum test for goodness of fit based on the empirical distribution which gives more weight to the tails of the distribution.

[23] Results are available upon request from the author.

declining importance of sporting success in determining efficiency may in fact undermine the quality and competitive nature of English football. We argue that sporting and financial outcomes must be considered jointly in the spirit of the regulations. Having done so, our assertions are rather gloomy. The costs associated with FFP regulations appear to offset the gains, leaving the average club less efficient and the distribution of efficiency outcomes wider under more severe regulatory regimes.

Our efficiency model permits an analysis of the drivers of inefficiency at the club level. Table 6 presents the results of this analysis using two stage regression procedure[24] . Here our dependent variable is a measure of club specific deviation from the cost efficient frontier. We model inefficiency as a function of several binary explanatory variables that describe the operating environment of the club in question:

- Has the club been involved in a push for promotion to the Premier League in the season immediately prior?
- Has the club been relegated from the Premier League to the Championship at the end of the prior season?
- Did the club compete in the UEFA Champions League in the prior season?
- Did the club compete in the UEFA Europa League in the prior season?
- Would the club be classed as a violator of the break-even requirement as defined using the various levels of break-even stringency?

[24] Importantly this two-stage regression procedure is not subject to the problems of the 2-DEA procedure (Simar & Wilson, 2007) because we do control for the effects of the z variables in the first stage when estimating equation 2 in the StoNED approach.

TABLE 6

Parameter Estimates For the Operating Environment Variables

Model	*No FFP*	*15M*	*10M*	*5M*	*5M3s*
Promotional Push	0.011**	0.026**	0.042**	0.031**	0.051*
	(0.005)	(0.013)	(0.02)	(0.016)	(0.029)
Relegated	-0.011	-0.014**	-0.011***	-0.055***	-0.012
	(0.011)	(0.007)	(0.004)	(0.015)	(0.009)
CL	0.041***	0.051**	0.051**	0.021**	0.016*
	(0.007)	(0.025)	(0.021)	(0.01)	(0.009)
EL	0.012**	0.025	0.009	0.002	0.002
	(0.007)	(0.026)	(0.021)	(0.01)	(0.008)
BE15M		0.026***			
		(0.006)			
BE10M			0.072***		
			(0.012)		
BE5M				0.084***	
				(0.011)	
BE5M3s					0.141**
					(0.071)
Observations	443	443	443	443	443
Partial R^2	0.941	0.955	0.961	0.922	0.961

Season/Tier dummies are included on all models but excluded from table 6 for brevity. *** p<0.01; **p<0.05; *p<0.1. The R2 reported are partial as they are only for the parametric part of the model. They represent the proportion of the variance that is left unexplained by the nonparametric part, which can be explained by the z-variables.

Table 7 presents the marginal effects of the environmental variables. As described in the methodology, these have the intuitively appealing interpretation as the expected group difference in the geometric mean of a club's inefficiency.

We note that pushing for promotion to the Premier League leads to an increase in inefficiency at the club level (in the region of 1% to 5%). Moreover, as the degree of regulatory severity increases the efficiency implications of the promotion push loom larger. We contrast this with relegation. Clubs that are relegated from the Premier League become more cost efficient in the following season - this may in part reflect the parachute payments received in the season which follows relegation. However across most regulatory regimes the absolute marginal effect is more muted than that associated with a promotion push.

It is interesting to note that despite the perceived cash bounty of playing in the UEFA Champions League, clubs who do so are less cost efficient than those who do not. Playing in the Champions League is typically associated with an efficiency decline of between 1% and 5% under various levels of regulatory scrutiny. This is consistent with the observation that margins of the Champions League regulars are thinner primarily because the cost of

assembling and servicing a squad capable of qualifying for the Champions League brings with its enormous cost implications[25]. In addition one could also assert that the imposition of playing Champions League football (where games are scheduled midweek) decreases levels of domestic performance lowering domestic sporting efficiency. Europa League competition has a much more muted impact as evidenced by the statistical insignificance of this dummy variable. This is perhaps unsurprising given that clubs competing in this competition have considerably lower expenditure on playing talent and salaries than those in the Champions League.

Clubs that are defined as violators of the break-even condition under the various regulatory regimes are less cost efficient. As the degree of regulatory severity increases, so too does the relative inefficiency of violators compared to non-violators. Clubs which violate break-even requirements are typically between 2.63% and 15.15% less efficient than compliant peers. In the more severe regulatory regimes, the marginal effects on the violation dummies are considerably greater than those relating to European club competition, promotion or relegation.

TABLE 7

Marginal Effects of Environmental Variables

Model	*No FFP*	*15M*	*10M*	*5M*	*5M3s*
Promotional Push	1.11%**	2.63%**	4.29%**	3.15%**	5.23%*
Relegated	-1.09%	-1.39%**	-1.09%***	-5.35%***	-1.19%
CL	4.19%***	5.23%**	5.23%**	2.12%**	1.61%*
EL	1.21%**	2.53%	0.90%	0.20%	0.20%
BE15M		2.63%***			
BE10M			7.47%***		
BE5M				8.76%***	
BE5M3s					15.14%***

***p<0.01;**p<0.05,*p<0.10

[25] See table A1 in the appendix for more information

Conclusion

Against a backdrop of rising indebtedness and financial instability of European football clubs, UEFA introduced “Financial Fair Play” regulations in 2010. Based around the concept of a financial “break-even” requirement, variants have subsequently been adopted by the top two leagues of the English professional football pyramid - the Premier League and the Championship.

Our study analyses the efficiency implications of the introduction of a break-even constraint. We attempt to do so in a manner that informs the discussion on whether the regulations serve to fulfil the dual regulatory goals of encouraging clubs to be more efficient whilst fostering competitive balance.

In order to achieve this aim we use a stochastic non-parametric efficiency model to describe the clubs production function. This formulation is flexible enough to allow us to look at the overall efficiency impact of break-even constraints in addition to the relative importance of financial and sporting output in achieving efficient outcomes. We analyse several levels of break-even regulatory severity.

We find that as the degree of break-even regulatory severity increases the average club moves further from the efficient frontier and the distribution of efficiency outcomes widen. This implies that, on average, the FFP regulation, rather than engendering efficiency actually decreases it and drives a larger efficiency wedge between clubs at the top and bottom of the efficiency distribution.

The models employed also reveal that as regulatory severity increases each unit of league revenue share captured comes at an increasing cost of league points share. On the other hand, each additional unit of league point share captured comes at a decreasing cost of revenue share. As such, it appears that break-even-based financial regulation raises the relative importance of financial outcomes, whilst simultaneously lowering the relative importance of sporting outcomes in determining overall club efficiency. One might consider this a desired outcome of the regulatory framework in that financial outcomes have heightened importance. It is important to note that the regulations seek to improve competitive balance in the interests of maintaining a desirable spectator experience. To that end, our findings suggest that FFP regulations decrease the relative importance of sporting success for clubs, thus undermining competitive intensity. We posit that this is an unintended consequence of the FFP regulations, contrary to their stated goals.

Finally, we look at some of the environmental drivers of efficiency at the club level. These relate to transitioning between the top leagues of the English football pyramid, playing in European club competitions and being classified as a violator of break-even requirements under various formulations.

We note that pushing for promotion to the Premier League in a given season significantly reduces the level of efficiency for clubs and in general the effect of the promotion push is larger as the degree of regulatory severity increases. Generally relegated clubs improve their efficiency post relegation and we contend that this is in part due to the receipt of 'parachute' payments from the Premier League. We find that despite the perceived cash bounty of the Champions League, clubs who play in the competition are less efficient than their peers. The efficiency impact of Europa League competition is rather more muted. Unsurprisingly, clubs who are defined as violators of the break-even constraint are less cost efficient than their peers with the efficiency gap widening as the degree of regulatory severity increases.

Our study contributes to the regulatory debate in professional football. We join a group of commentators who document unintended consequences of the break-even requirement of the Financial Fair Play regulations. We suggest that it reduces the average club's efficiency and results in a wider efficiency spread amongst clubs in the league. This runs counter to the aim of promoting efficiency and balance amongst clubs. The more severe the level of break-even imposed the greater the degree of efficiency erosion and the lower the level of efficiency balance. This engenders a league structure where the positions of the most efficient become further ossified over time, a fear raised by other commentators (e.g., Muller et al 2012 ; Peeters and Szymanski 2014). Moreover given the close relation between efficient revenue generation and future expenditure on sporting talent, and that between sporting talent and sporting outcomes our research suggests that the FFP regulations will make the league less competitive in a sporting sense. In compromising the spectator experience it may also undermine the overarching commercial appeal of the league.

Our study also has implications for club management who operate under break-even based regulatory regimes. We note that if a club strives to be efficient, the greater the degree of regulatory severity the more the club should devote resources to capturing revenue share over point share. At the league level, given the relatively even (by European standards) central distribution of broadcast and commercial revenues from the Premier League and Championship, we suggest that time and resource would be more productively employed in developing new club specific sponsorship deals and commercial partners rather than investing in playing talent. We also urge caution in chasing either promotion to the Premier League or Champions League qualification. While both come with a perceived cash bounty, the costs incurred in achieving them overwhelm any efficiency gains. To the extent that these extra costs lead to a violation of the break-even constraints, the efficiency erosion is significant and increases with the degree of regulatory severity.

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Appendix A

The Cost of Competition

Despite burgeoning revenues in the English game profitability remains elusive. The primary expense items that consume revenue are player costs[26] ,which have exploded in the Premier League era. The mean (median) wage spend in the Premier League and Championship in the 2013/2014 season was £95m (£69m) and £21m (£17m) respectively. At the Premier League Level, clubs spend around 60% of their revenue on wages, however this balloons to over 100% of revenue in the Championship. 11 of the 24 Championship members had wage bills exceeding revenues with Queens Park Rangers being the worst offenders with a wage multiple of almost twice revenue. High wage spend coupled with transfer amortization charges and other operating expenses result in the average Championship club making a pre-tax loss of around £11m. This contrasts with an average pre-tax profit of around £10m for Premier league clubs. 5 of the 20 Premier clubs reported a pre-tax loss in 2013/2014. All but one Championship club lost money pre-tax. Interestingly, the Premier League elite do not fare markedly better in profitability than their divisional peers. The costs of assembling and maintaining a squad that can compete in the Champions League and avoid relegation are non-trivial (Carmichael et al., 2011).

We can further analyse the financial statement value of the playing talent employed at the club by observing the net book value of player registrations (after deducting accumulated amortization). Here we see a huge divergence between the Premier League and Championship. The median Championship club has a squad book value of around £3m, compared to £38m in the Premier League, and £206m amongst the teams who regularly qualify for Champions League football. Clearly a promotion to the Premier League brings with it huge revenue potential, however to stay there requires significant investment in playing talent and wages. In turn, qualifying for the Champions league requires massive investment again.

Table A1

Summary Statistics for 2013/2014 Season

Category	**Champions League Regulars****		**Premier League**		**Championship**	
Variable	**Amount**	**% of Revenue**	**Amount**	**% of Revenue**	**Amount**	**% of Revenue**
Mean Revenue	£352m	100%	£163m	100%	£20m	100%
Median Revenue	£336m	100%	£109m	100%	£19m	100%
Mean Wage Cost	£196m	56%	£95m	60%	£21m	104%
Median Wage Cost	£198m	57%	£69m	59%	£17m	94%
Mean Amortization	£66m	19%	£31m	19%	£3m	15%

[26] Primarily, player salaries and amortisation of player registrations.

Median Amortization	£66m	18%	£21m	19%	£2m	10%
Mean Trading Gain	£20m	6%	£14m	8%	£1m	9%
Median Trading Gain	£7m	2%	£4m	2%	£1m	5%
Mean Pre-Tax Profit	£9m	2%	£10m	6%	-£11m	-55%
Median Pre-Tax Profit	£10m	3%	£9m	7%	-£8m	-44%
Mean NBV Player Registrations	£188m	NA	£69m	NA	£4m	NA
Median NBV Player Registrations	£206m	NA	£38m	NA	£3m	NA

**Manchester United, Arsenal, Chelsea, Manchester City

In order to finance player acquisition and wages, clubs have become increasingly indebted. The aggregate net debt of clubs in the Premier League and Championship totalled £2.153bn and £1.116bn respectively in the 2013/14 season. The average (median) Premier League club has net debt of £108m (£48m). The average (median) Championship club had net debt of £49m (£22m). In the Championship in particular where the majority of clubs are loss making, many question the sustainability of the financing arrangements and the motivations of the owners who oversee these arrangements. Indeed one could reasonably conclude that many Championship clubs have 'bet the house' on eventually securing promotion to the premier league and are dangerously over-leveraged.

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