Marketing and sponsorship in French football league

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Abstract: This paper seeks to analyse the production function of the French league, using a quantile regression in order to be able to extend the study along the whole production distribution aiming to investigate whether the relationship between production and financial and marketing variables is homogenous and stable through the distribution by running regressions for average total wins. Policy implications are derived.

Keywords: sport wins; quantile regression; financial and marketing variable differentials; France.

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1 Introduction

In sport production economics, the production process is usually analysed by using the dual approach (i.e., cost functions or profit functions). Much of this research is focused in technical efficiency analysis of US sports (i.e., Hofler and Payne, 1997; Hadley et al., 2000), baseball (i.e., Porter and Scully, 1982; Ruggiero et al., 1997; Koop, 2002), basketball (i.e., Zak et al., 1979), hockey (Kahane, 2005). Production functions are relative rare in sports (Hofler and Payne, 2006; Dawson et al., 2000; Scully, 1994). The present research extends the sport production function applying it to the French league with a quantile regression. In particular, it used a panel data from the French football first league over the period 2002/2003–2005/2006.

The motivation for the present research is the following: first, efficiency of football clubs or football managers has been analysed in almost all European leading football leagues adopting frontier models (i.e., England, France, Germany, Greece, Italy, Portugal, and Spain). For example, the efficiency of UK football league has analysed by Dawson et al. (2000), Carmichael et al. (2001), Barros and Leach (2006a, 2006b), and Barros and Garcia-del-Barrio (2008). The Spanish football league was analysed in Espitia-Escuer and García-Cebrian (2004, 2006, 2008), Ascari and Gagnepain (2007), Barros et al. (2008, 2009). The Portuguese league has been analysed by Barros and Santos (2003). The Greek league was analysed by Barros and Douvis (2008). Finally, the German league has been analysed by Kern and Süssmuth (2005). Confronted with this enlarging research, two leading football leagues are absent from applied research on efficiency, first the Italian league and second the French league. Second, quantile regressions in sports are rare (Bassett, 2007; Agesa et al., 2008; Brown and Jewell, 2005). Therefore, the present research contributes for the sport research using a quantile regression to estimate the sport production function of the French football league. Third, the shape of the production functions relies on unobservable characteristics of the firms (or the football clubs in our case) estimating a common function may not be appropriate. Hence, we advocate using quantile regression (Koenker and Basset, 1982). Quantile regression can be seen as a natural analogue in regression analysis to the practice of using different measures of central tendency and statistical dispersion to obtain a more comprehensive and robust analysis mixture models or latent class models to control for unobserved heterogeneity. An advantage to quantile regression is the fact that any quantile can be estimated to discover more useful predictive relationships between variables in cases where there is no relationship or only a weak relationship between the means of such variables or the data display with unequal variation of one variable for different ranges of another variable. Fourth, sport performance is observed in the sport field, but financial performance has no such transparency, being observed only in the sport club financial report. Therefore, the comparison of sport and financial results is of paramount importance when evaluating the efficiency of a football club. Finally, Moreover, the Deloitte and Touche financial reports are not published in all European countries, as it happens in the French case. Fortunately, the French football clubs publish their financial reports and in the French case the French football league publishes the results in their web page. Thus, it can be obtained all the necessary data in order to implement a cost function framework.

The rest of the paper is organised as follows: in Section 2, the contextual setting is presented; in Section 3, a literature survey is presented; in Section 4, the methodology is

presented. Section 5 contains data and empirical specification. Results are presented in Section 6. Finally some conclusions are drawn.

2 Contextual setting

The French League-1 football league has become one of the most important football leagues. Despite its importance, no published paper analysing the efficiency exists on the French football league. Table 1 shows some information on the financial and sport situation of the French first division league in the 2005–2006 season. The main characteristic of the French League-1 Football League is that in recent years Olympique Lyonnais concentrates many of the top players in the league and achieved the highest position in the league. Furthermore, Olympique Lyonnais is since 2006 onwards quoted in stock exchange. Direct competition with this leading position is searched by the Paris Saint Germain and the Olympique de Marseille (which owns the majority of supporters). Lastly, since the early 1990s most of the French clubs have adopted corporate status, thereby being enforced to publish their financial accounts regularly.

Table 1 Teams statistics (2005–2006 season)

Teams	*Attendance*	*Wages*	*TV receipts*	*Position*
A.C. Ajaccio	3,414	7,209	9,705	18
A.J. Auxerre	10,668	16,220	17,544	6
F.C. Girondins de Bordeaux	24,247	20,204	12,300	2
Le Mans Union Club 72	11,437	12,433	18,172	9
Racing club de Lens	34,445	18,746	16,764	4
LOSC Lille	13,198	14,757	20,513	3
Olympique Lyonnais	34,465	51,131	21,539	1
Olympique de Marseille	49,200	35,873	22,062	5
F.C. de Metz	16,039	9,277	9,569	19
A.S. Monaco F.C.	11,182	38,864	35,164	10
A.S. Nancy Lorraine	17,163	10,346	1,821	12
F.C. Nantes Atlantic	29,449	24,496	13,465	14
O.G.C. Nice	10,903	9,806	11,394	8
Paris Saint Germain	40,486	31,634	31,270	11
Stade Rennais F.C.	25,000	16,493	16,627	7
A.S. Saint-Etienne	29,111	11,472	16,782	13
F.C. Sochaux Montbeliard	14,257	14,240	15,865	15
Racing Club de Strasbourg	18,983	11,766	13,481	20
Toulouse F.C.	18,875	9,609	11,212	16
E.S. Troyes Aube Champagne	13,795	9,638	15,465	17

3 Literature survey

The analysis of sport leagues is based in either cost or production functions. Cost functions in sports are used almost exclusively in efficiency, namely in the econometric or parametric approach. We find several papers that adopt stochastic cost frontier models in football. For instance, Barros and Leach (2006b, 2007b) estimated cost stochastic frontiers for the English premiership, using as outputs both the points achieved in the season and spectator attendance. Production functions are have been applied by Hofler and Payne (1997) using a stochastic frontier model to the NBA, using the number of wins as output. Barros et al. (2008) analysed the cost efficiency of Spanish football teams using a random parameter model. Kahane (2005) investigated the relationship between inefficiency and discriminatory hiring practices in the national hockey league (NHL), using a stochastic frontier model. Finally, Barros et al. (2009) identified three segments in the Spanish football league using a latent class model in a cost function framework.

However, quantile regression is adopted to analyse costs and production functions (Bernini et al., 2004; Christensen, 2003).

This paper aims to enlarge this literature analysing a non-analysed previously leading football league adopting the quantile regression to the analysis of the production function.

4 Method

In a production equation setting, the quantile regression model can be written as:

$$wins_i = x_i\beta_\theta + \mu_{\theta i} \text{ with } Quant_\theta\left(wins_i / x_i\right) = x_i\beta_\theta \tag{1}$$

where x_i denotes the vector of exogenous variables and β_θ is the vector of parameters. $Quant_\theta(wins_i/x_i)$ denotes the θth conditional quantile of the *wins* given x. The θth regression quantile, $0 < \theta < 1$, is defined as a solution to the problem:

$$\min_{\beta \in R^k} \left\{ \sum_{i:\ln w_i \geq x_i\beta} \theta \left| wins_i - x_i\beta_\theta \right| + \sum_{i:\ln w_i < x_i\beta} (1-\theta) \left| wins_i - x_i\beta_\theta \right| \right\} \tag{2}$$

This is normally written as:

$$\min \sum_i \rho_\theta\left(wins_i - x_i\beta_\theta\right),$$

where $\rho_\theta(\varepsilon)$ is the check function defined as $\rho_\theta(\varepsilon) = \theta\varepsilon$ if $\varepsilon \geq 0$ or $\rho_\theta(\varepsilon) = (\theta - 1)\varepsilon$ if $\varepsilon < 0$. The problem does not have an explicit form, but can be solved by linear programming methods (Buchinski, 1994; Koenker and Basset, 1982).

5 Data and results

To estimate the cost frontier, we used an unbalanced panel data on French first football league over the period 2003–2006 available on the French football league site (http://www.lfp.fr/actualiteLFP/dncg.asp), relative to Ligue 1-Orange finance. It is important to note that we gathered the data of all teams which participated in the

League-1 (i.e., 20 teams each season) in the years analysed, but due to the promotion and relegation system it is obtained an unbalanced panel data set.

Table 2 shows the descriptive statistics of the variables used in the empirical analysis.

Table 2 Descriptive statistics of the data (2003–2007)

Variable	*Definition*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
Number of *wins*	Number of club wins measure by the points won in the league	50.79	11.60	29	84
Capital	Stock in euro at constant price, 2005 = 100	8,799.23	16,685.14	–9,509.46	148,215
Wages	Wages and other labour costs in euro at constant price, 2005 = 100	20,088.28	14,601.59	4,002	93,469
Attendance	Number of attendants by season	20,695.99	11,642.44	3,047	51,786
Points	Number of points won	51	12	29	84
Merchandising	Receipts of merchandising in 000 euros at constant price, 2005 = 100	1,534.249	2,111.118	4	11,730.75
Sponsoring	Sponsoring receipts in 000 euros at constant price, 2005 = 1,000	6,824.977	4,665.448	1,102	20,058
Subvention	Subvention receipts in 000 euros at constant price, 2005 = 1,000	1,209.151	1,028.138	0	7,089.342
TV	TV receipts in 000 euros at constant price 2005 = 100	17,309.19	9,848.93	1,821	46,194

It can be observed that stock value is lower than the wages paid, signifying that there is under capitalisation in French league. The subvention is zero for some clubs signifying that subventions usually given by municipalities are declining in the French league.

The empirical results of the quantile regression were obtained by regressing the number of number of club wins (Hadley et al., 2000; Hofler and Payne, 2006) against covariate that are expected to explain the production function, such as inputs and outputs:

$$\begin{aligned} wins_{it} = {} & \beta_{q0} + \beta_{q1} Labour + \beta_{q2} Capital + \beta_{q3} Attend_{it} + \\ & \beta_{q3} \log Merchandisng_{it} + \beta_{q4} \log Sponsoring_{it} + \\ & \beta_{q5} \log Subvention + \beta_{q6} \log TV + u_{it} \end{aligned} \tag{3}$$

where $q \in \{0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9\}$ represents the decile.

This implies estimating nine quantile regressions by clubs. Instead of carrying out this procedure one at a time, the regressions were estimated through an equation system. The main advantage of this procedure is that simultaneous-quantile regression allows us to estimate the variance-covariance matrix of the estimators via bootstrapping, including between-quantiles covariances. The estimation of the variance-covariance matrix was carried out using the method proposed by Koenker and Basset (1982). The results are displayed in Table 3.

Table 3 Quantile average regression (dependent variable: wins)

Variables	*Average*	*q10*	*q20*	*q30*	*q40*	*q50*	*q60*	*q70*	*q80*	*q90*
Constant	18.961**	20.735*	15.843**	11.414**	14.323**	18.961**	30.143*	33.059*	32.169*	31.828*
	(9.693)	(20.662)	(4.557)	(5.496)	(7.493)	(9.693)	(9.067)	(8.181)	(10.297)	(14.041)
Labour	0.0424*	0.009*	0.029*	0.032*	0.037*	0.042*	0.057*	0.068*	0.063*	0.051*
	(2.014)	(3.124))	(3.134)	(3.034)	(4.219)	(4.371)	(3.895)	(4.017)	(5.412)	(3.261)
Capital	0.012*	0.016*	0.008*	0.005*	0.004*	0.0012*	0.0018*	–0.002*	–0.004*	–0.010*
	(3.218)	(2.836)	(2.942)	(2.591)	(3.381)	(3.137)	(3.532)	(3.562)	(3.673)	(3.904)
Attendance	0.017**	0.029**	0.019**	0.012**	–0.006**	–0.017**	–0.017**	0.001*	0.0079*	0.018*
	(3.002)	(2.342)	(4.132)	(5.219)	(3.295)	(4.178)	(5.903)	(4.872)	(5.026)	(5.238)
Subvention	0.0138**	0.088*	0.213*	0.207*	0.231**	0.131**	0.119**	0.149**	–0.272**	–0.233**
	(3.123)	(3.021)	(4.115)	(4.373)	(4.290)	(3.784)	(5.204)	(5.114)	(5.038)	(4.956)
Merchandising	0.052*	–0.072*	–0.017*	–0.014*	–0.028*	–0.052*	–0.041*	–0.038*	0.041*	0.119*
	(3.214)	(3.232)	(4.218)	(4.121)	(4.280)	(4.916)	(4.380)	(4.329)	(4.156)	(4.346)
Sponsoring	0.022*	–0.048**	–0.011**	–0.014**	–0.016*	0.022*	0.013*	0.022**	0.059**	0.092**
	(3.125)	(3.732)	(4.218)	(4.258)	(7.366)	(5.290)	(4.512)	(4.295)	(4.320)	(4.661)
TV	0.030***	0.033***	0.012	0.022	0.016	0.034	0.0087	–0.008	–0.009	–0.0014**
	(3.121)	(2.023)	(1.218)	(0.452)	(1.456)	(1.954)	(2.562)	(1.894)	(2.034)	(3.893)
Pseudo R^2	0.268	0.268	0.297	0.293	0.286	0.268	0.264	0.276	0.324	0.430
Observations	100	100	100	100	100	100	100	100	100	100

Notes: Bootstrapped standard errors (1,000 reps) are shown in parentheses under the parameters.
*1% statistical significant coefficient level; **5%; ***10%.

Since the dependent variable is the wins, coefficients can be interpreted as the percentage of increment of the wins at the quantile q_i due to the covariates. If these coefficients were equal to zero, given a particular quantile, covariates would not have an effect on wins. Since the coefficients are statistically significant, it means that the value of the wins in each quantile is statistical significant. Furthermore, the larger the coefficient, the greater the impact of covariates, along the quantile distribution.

Comparing the average regression with the quantile regression it is found that the mean coefficients are misleading in evaluating this relationship because it predicts a positive relationship for all covariates that is not supported by the quantile regression. The quantile regression shows that the relationship between covariates and wins is not linear for some variables. For example attendance increases wins for lower and upper quantiles, but not for middle quantiles where it lowers wins. The same pattern emerges for capital, merchandising, sponsorship and TV receipts. Therefore, labour and subventions have a linear positive relationship with wins, signifying that better labour and higher subventions increases French first league clubs wins. However, the other variables do not show this linear pattern. Capital increases wins up to the sixth quantile, but decreases wins for the upper quantiles. Attendance increases wins for all quantiles, with exception of the middle quantiles. Merchandising and sponsorship also increase wins only for the upper quantile distribution. Finally, TV receipts increases wins for the lower and middle quantiles. Therefore, average regressions can be misleading. The merchandising funding has a pattern similar to the attendance

6 Discussion

This paper presents empirical findings concerning wins determinants of French football league with a quantile regression model. First, it is concluded that non-linear relationships is high at both extremes of the win distribution and therefore average regressions can be misleading. Second, it verified that some variables increase the wins along all the distribution such as the constant, labour and subvention, signifying that for these variables, average regressions are acceptable, since they have a linear relationship with wins. However, for the other variables it does not have a linear relationship.

What is the meaning of this result? The meaning of this result is that merchandising and sponsoring is not available in the French market for the smaller football clubs, those situated in lower quantiles. TV receipts are important for clubs in lower and middle quantiles, but not for the upper quantile clubs. Attendance is not important by the clubs in the middle range. Capital is not important for the clubs in the top three quantiles. Therefore, the French first football league wins strategy has different funding covariates, with top clubs specialising in attendance, merchandising and sponsoring and lower football clubs specialising in attendance, subvention and TV receipts, while middle football clubs rely on subvention and TV receipts.

What is the explanation for such results? The explanation is the following: first, subvention is a traditional fund of all French sport clubs and also for football, with football clubs relying on it to succeed in the sport market. This is the result of the Napoleon tradition (Meijer and Meijer, 2002) characterised by a highly centralised state, oriented by law and predominantly managed by lawyers strong led immersed in bureaucracy, without transparency and far removed from the dynamics of the market. In this context, municipalities usually fund football clubs that they consider to represent a

regional embassy of their city. This is particularly important for small cities, with small football clubs. Second, clubs situated in the lower and upper quantile distribution use attendance to fund their activity, since those in the top have a long established reputation reflected in their highly levels of attendance. The clubs in lower part of the quantile distribution also use attendance, probably because they are in the relegation zone and therefore the risk of relegation attracts attendance. In contrary, clubs situated in the middle zone have difficulty to attract attendance. It is difficult to have fans in middle zone. Therefore, attendance reflects the excitement and reputation of the clubs. Merchandising is positive only for top quantile football clubs, those with well known players, from whom they sell shirts. Sponsoring is also available only for top football clubs, signifying that this form of funding is not available for small football clubs. However, regional companies also sponsor middle football clubs, but not those situated in the lower or the funds used are not statistical important. However, sponsoring is positive for more quantiles than merchandising, meaning that this for of funding is more distributed than merchandising. TV receipt is important for clubs situated in the lower and middle quantile distribution, but not for those in the upper quantile distribution. This may reflect the relative importance of TV funding in different football clubs. Those relaying exclusively on TV and subvention have short alternatives of funding their wins. Labour is important for all clubs and capital only for clubs in the lower and middle part of the quantile distribution.

7 Conclusions

This paper estimates a production model for a sample of French football clubs with a quantile regression, using data 2003–2007. The conclusion is that different patterns of differentiation on the relationship between production and covariates are observed in the league analysed, signifying that average regressions are unable to capture the non-linear relationship that exists between the covariates and wins. More investigation is needed to confirm the present research.

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