Sporting, financial and stock market performance in English football: an empirical analysis of structural relationships

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Abstract

This paper uses structural equation modeling to examine the linkages between financial performance, sporting performance and stock market performance for English football clubs over the period from 1995 to 2007. The results indicate that there is a strong correlation between financial and sporting latent constructs. Additionally, the study indicates that the sports managers seek to achieve a minimum level of profit and maximize sporting performance. This situation remains even when the club is owned by a group of investors. On the other hand, the confirmatory factor analysis and regression analysis show that financial and sporting factor scores are statistically correlated with stock returns, but not with risk.

Keywords: Management; sports; statistics.

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In the last two decades, a series of events have occurred that turned professional football in Europe into an industry with unprecedented economic dynamism. The transformation of football clubs into commercial companies encouraged some investors to take prominent positions in the capital of such companies; investing very large amounts of money and allowing access to credit from other institutions. Developments which occurred in the media sector (technological and competitive) have enabled clubs to negotiate more advantageous broadcasting rights. The creation of the Champions League in the 1992/93 season resulted in a competition that joins up the top clubs in Europe. This competition organized by UEFA generated 610 million Euros in revenues in the 2005/06 season, and 437 million Euros out of this amount were distributed to the 32 competition participants (Deloitte & Touche, 2007). Also, changing the rules of player's labour market by the Bosman Law of December 1995 contributed to the development of an international market of buy and sell the sport rights of players (the total price was typically unknown).

In sports industry literature there are some empirical studies on the production function and the technical efficiency analysis of the clubs in the National Football League (Hadley, Poitras, Ruggiero & Knowles, 2000), Major League Baseball (Scully, 1994), rugby league (Carmichael & Thomas, 1995) or the football or soccer (Boscá, Liern, Martínez & Sala, 2009; Carmichael, Thomas & Ward, 2000; Gerrard, 2005; Kern & Sussmuth, 2005). Based on the theme, in football you can see that some more recent studies have in common the use of the methodology of data envelopment analysis or DEA (Barros & Leach, 2006; Barros & Santos, 2004; Boscá et al., 2009; Haas, 2003; Haas, Kocher & Sutter, 2004). This non-parametric linear programming technique can be analyzed through the construction of the efficient

frontier, the clubs which are more efficient in transformation inputs into outputs. However, it doesn't permit to determine the objectives associated with the variables used in the model. In the case of outputs is not possible to identify whether the purpose of sporting performance is more or less important than the financial performance or whether both affect each other. This is important because in the literature (Dobson & Goddard, 2004; Kesenne, 2007; Quirk & El-Hodiri, 1974; Sloane, 1971; Vrooman, 2000) there are different theories about the main purpose of sport managers: to maximize the financial performance or to maximize the sporting performance or to maximize both. Haas et al. (2004) considers a further objective which concerns the attraction of fans to the stadium - social purpose - but this was considered by researchers as less important compared to the other two objectives.

The assessment of sporting and financial performance cannot be separated from the fact that clubs participate in various competitions, especially in competitions organized by UEFA. In the 2005/2006 season, FC Barcelona received from its participation in UEFA's most important competition 31.3 million Euros (Deloitte & Touche, 2007). Furthermore, the results of the national cup (for example: FA Cup) are also important because they are one way to get access to the UEFA Cup. With rare exceptions (Barajas, Fernández-Jardón, & Crolley, 2007) studies so far carried out (e.g. Barros & Leach, 2006; Dobson & Goddard, 1998, Gerrard, 2005) consider only the results obtained in the national championship league.

However, analysis of financial performance has been considered only according the total revenue obtained by the club regardless of the competition in which it participated. This is an inconsistency which is a limitation in research so far produced. Although the studies of Haas (2003), Haas et al. (2004) and Zuber, Yiu, Lambc and Gandar (2005) consider the participation of the club in European

competitions, it is done in a dummy variable form (that is, it only indicates the participation or non participation in European competitions). However, it is completely different in sporting performance measurement whether the club has not passed the first stage of the competition and reached the final stage. Indeed, a club that has reached the final of the Champions League will benefit in terms of match day income and also of broadcasting rights of matches, premium awarded by UEFA and other revenue.

Prices of assets traded on the stock market should reflect all available information about issuers that should be considered in an efficient capital market. Consequently, it is expected that the share prices of sporting companies incorporate information on the financial performance based on financial statements (Thompson, Olsen & Dietrich, 1987) and sports scores (Berument, Ceylan & Gozpinar, 2006; Boido & Fasano, 2007; Duque & Ferreira, 2007). However, studies so far developed based on football clubs have not simultaneously studied the impact of the possible relationship between stock performance and financial performance along with the sports variables and what the meaning of that relationship is.

This paper uses structural equation modeling (SEM) to identify whether changes in the main financial indicators have led to changes in the main sporting indicators for Premier League teams. In the other hand, this study investigates whether changes in sporting and financial indicators have led to changes in stock market performance. In order to also capture the dynamic relationship between sporting and financial performance, this study performs a cross-correlation analysis to measure the strength and direction of correlation of the most important sporting and financial indicators.

SEM is a statistical technique that allows simultaneous directional relationships of a set of structural equations or covariance structure models. More specifically, SEM has the ability to explain the correlations or covariance of the observed variables in terms of relationships between latent (or non-observed) variables. In this work, sporting performance and financial performance are concepts (constructs) that need to be measured through a set of observable variables. The studies using the technique of DEA (Barros & Santos, 2004; Barros & Leach, 2006; Boscá et al., 2009; Haas, 2003; Haas et al., 2004) do not use statistics to measure the representativeness of the variables against the concept. SEM incorporates both, the study of the relationship between concepts and the relationship with the concept of observable variables.

This study is focused on English clubs because England is the birthplace of football was and where changes in the football industry have been more relevant. It adds value to the literature because the previous studies have not demonstrated a consensus on whether there is an association between sporting and financial performance. It also considered both the sport results in national competitions and in UEFA competitions. Furthermore, it uses a new methodology that allows us to study the simultaneous impacts of the possible relationships between stock performance and financial performance and sporting results and what is the direction of these relationships.

This paper is organized as follows. Section two provides a detailed account of previous research in order to contextualize the issue and identify the research questions that guided this study. Section three describes the procedures for obtaining the data and methodology used to construct the variables which were subject of study. Section four contains the empirical results for the structural

equation modeling. Section five presents the empirical results for the cross-correlation analysis. Finally, section six concludes.

Literature Review and Research Questions

The linkage between sporting and financial performance

The strong economic growth that the football industry has seen since the late 1990s, have begun to attract the attention of the academic community in order to study issues related to the management performance of football clubs. The research produced so far has been concerned with the performance itself, and the analysis of the performance determinants. According to Szymanski (1998) the performance of a football club is reflected basically in two fields: sporting and financial performance. As determinants of such performance are among others, issues related with the game itself (Boscá et. al., 2009; Carmichael et al., 2000), management of clubs guided by the market (Ozawa, Cross & Henderson, 2004), skills of players (Gerrard, 2005) and coaches (Dawson & Dobson, 2002), the change of coach (Audas, Dobson & Goddard, 2002; Bruinshoofd & Weel, 2003; Hope, 2003), market size or base of support from club (Buraimo, Forrest & Simmons, 2007), the strategic actions undertaken by the clubs (Heij, Vermeulen & Teunter, 2006).

The performance results of sporting success or failure that the club has had in domestic and international competitions, in other words, its ability to achieve victories, to win competitions in which it participates; while the financial performance measures the value created by the clubs for investors. According to Simon (2000) any company seeking profits because the ability to survive and prosper over time is dependent on the ability of the club to generate funds that reward production factors.

The analysis of sporting and financial performance becomes very important when we want to study what are the strategic objectives to be achieved by managers of football clubs. Quirk and El Hodiri (1974) assume that teams are profit maximizers, while Sloane (1971) and Kesenne (2007) considers that the teams should been seen utility maximizers in the search of non-profit goals (games won, popularity of the club) subject to a financial constraint. The first current has been considered as a reference in the U.S. literature, while the second current is mainly taken in the European literature (Hoehn & Szymanski, 1999).

Given the economic theory it is expected that a club owned by shareholders has as a main objective the maximization of value (dividends and valuation of invested capital). However, football provides that shareholders may also be guided by objectives linked to sporting performance even if it means a decline in financial performance. Therefore, Vrooman (1997, 2000) considers that in the presence of the sportsman-owner effect, the managers seek to simultaneously maximize the financial and sporting performance. The same view is expressed by Szymanski and Kuypers (1999) which state that the long-term trend is to combine profit with performance on the pitch.

Some current theoretical derivations were developed based in the above theory. Gerrad (2005) developed a resource-utilisation model for the analysis of technical efficiency. It is shown that the clubs that seek to reconcile the financial and sporting performance for a given level of resources can get best sporting performance at the expense of deterioration in financial performance. This idea is also present in Proposition I of the Unified Theory of Capital and Labor Markets in Major League Baseball (Vrooman, 1997). In another study, Dobson and Goddard (2004) argue that the English clubs, in a context of financial constraints, seek primarily to maximize

revenue and wins than maximizing profit. In the same line of research is the work of Gerrard and Dobson (2000) and Morrow (1999). The former authors argue that the objective is to maximize sports performance since a minimum level of profit is achieved. While the second refers to the sporting success should be maximized in conjunction with maintaining the financial solvency of the club.

Besides the above theoretical developments in the literature we can find other empirical studies that examine the relationship between sporting and financial performance. One of the first empirical studies on this subject was made by Arnold (1991) that through an OLS model, found that the level of revenues for English clubs was strongly associated with their sports performance in the period from 1905 to 1985. Szymanski (1998) examined the correlation between the sports results and profit before tax of 40 English clubs for over 20 years. In only 54% of cases the improvement (decrease) in performance sport was reflected in an increase (decrease) in profits. Considering only the variables revenues and wages, Szymanski (1998) found a strong positive relationship between these variables and sporting performance. Consequently Szymanski (1998) and Szymanski and Kuypers (1999) described two general principles on the performance in football: i) *better league performance leads to higher revenue,* and ii) *increased wage expenditure leads to better league performance*.

Dobson and Goddard (1998) studied the relationship between sporting performance and gate revenue based on a sample of 77 clubs which maintained Football (or Premier) League membership continuously during 48 years. This study showed that a relationship between revenue and sporting performance existed only in 10 clubs and this dependence is primarily in smaller clubs. On the direction of causality of the relationship, this study shows that the level of gate revenue precedes sporting

performance. Recently, Barajas et al. (2007) studied, by an OLS model, the effect of sporting performance in revenues and Net Profit of the Spanish clubs that participated in the main championship during the seasons from 1998 to 2002. In the first case the correlation was between 66.8% and 88.5% (depending on the type of revenue considered) and in the second case only of 14.1%. Consequently, to obtain more revenue allows the club following season recruiting players with more talent and thus achieve better sporting performance. According to Buraimo et al. (2007) the direction of causality in which financial performance precedes sporting performance sports is a prophecy of the sport theory.

However, Szymanski (2001) found that despite the increasing inequality of income between clubs, this did not change the degree of competitiveness of the English professional leagues. The probability of winning or losing a game (sporting performance) was not affected by the improved financial performance. Moreover, the study of Pinnuck and Potter (2006) showed that the sporting performance of Australian football clubs have a positive effect in increasing the number of spectators and the loyalty of supporters (then in financial performance). However, Gerrard (2005) estimated that the improvement of 1% of points won by English clubs have a negative effect of 0.25% in operating profit.

Given the above literature, there is evidence that the revenues of the clubs are correlated with good sporting performance, but this relationship is not so clear when the financial performance is measured by operating profit or net profit. In short, the studies produced to date have not demonstrated a consensus if exist a positive association between sporting and financial performance. We think this situation is due by the type of variables that are used as indicators of financial performance. And

because of financial data correspond to total competitions in which the club participated but sporting data used in studies not consider all of these competitions.

In literature there are a number of articles they have in common the use of the DEA methodology as a tool to analyze the efficiency of football clubs (Table 1).

[Insert Table 1 in here]

DEA is a technique of linear programming that has a view of the economic transformation process of inputs into outputs using for this purpose the production function or production frontier. Its main aim is to establish a comparison between the technical efficiency of Decision Making Units, i.e., those who attained to maximize the relationship between inputs and outputs.

Based on observations of 5 seasons, Barros and Leach (2006) conclude that the clubs with more revenue and points are more efficient and in most cases examined the clubs are well run (they are efficient). The scale effect is a key factor to explain the different levels of competitiveness among the clubs. Haas (2003) and Haas et al. (2004) find that only between ¼ to ⅓, respectively, English and German clubs were efficient in the season (depends on the technique used for DEA). According to the study by Haas (2003), clubs like Arsenal and Liverpool were inefficient and Manchester United was efficient. However, these findings are contradictory to the sporting and financial results achieved by Arsenal. At the time Arsenal made a record pre-tax of 29.4 million pounds (slightly higher than the Manchester United), it was the final of the FA Cup (Manchester United was eliminated in 2nd round), it reached the quarter finals of the Champions League (had more victories in this competition than Manchester United) and took 2nd place in the championship which

was won by Manchester United. In the Portuguese case, Barros and Santos (2004) found that successful sports clubs are not necessarily financial success, and for some cases don't exist a positive relationship. This is corroborated by Haas et al. (2004) for the Germany clubs. It found that the levels of efficiency are not correlated with the sporting performance.

Of the studies listed in Table 1 only the work of Haas (2003) and Haas et al. (2004) consider in sporting performance the results obtained in international competitions as a dummy variable. However, the managers of clubs looking increasingly internationalize the brand of the club, and for this purpose, is very important the performance in international competitions. Furthermore, Haas (2003) and Haas et al. (2004) found respectively, that the main English and German clubs are inefficient if not considered the fact that they participated in UEFA competitions. Participation in the Champions League is a factor that enhances the growth of income of clubs, because in addition to premium for participation, the club gets television revenues, from tickets and merchandising and enhances the reputation of a brand. For example, in the 2005/2006 season, FC Barcelona has received from its participation in Champions League the amount of 31.3 million (Deloitte & Touche, 2007). With the exception of Barros and Santos (2004), these studies consider only financial variables such as wages and turnover, neglecting the effect of investment in acquisition of new players. For example, the amortizations recognized by English clubs, who competed in the Premier League, representing on average 19.8% of the turnover of the 2005/06 season.

When considering in outputs, indicators of financial and sporting performance we are implicitly assuming that the goal of managers is to maximize both performances. This conclusion is only possible to verify empirically that the coefficient of efficiency

of the DEA model is equal to 1 (organizational units deemed effective). If the coefficient is less than 1 it is assumed that the football club was inefficient. However, we do not know if in fact the purpose of sporting performance was more or less important than financial performance. So a club can be considered inefficient when in truth their managers had only one and not two strategic objectives. In short, it is important study if managers of football clubs seeking to reconcile the sports and financial objectives. This leads us to the following question of research:

Research question 1*:* Does a positive relationship between financial and sporting performance in English football clubs exist?

The influence of sporting and financial performance on stock market performance

In regulated capital market, to be considered an efficient market the price of assets traded on the stock market should reflect all relevant available information about issuers. This topic is indeed a theme that has deserved much attention in Finance, since Fama, Fisher, Jensen and Roll (1969) published a methodology on the study of events, namely the incorporation of public information on share prices. If the share price reflects all relevant information then is expected that share prices only change when new information are known about football clubs. In Finance literature we can find several works that have studied the behavior of the share price and certain types of events, including announcements of profits and dividends, sale of assets, etc. (e.g. Pritamani & Singal, 2001; Thompson et al., 1987).

In football industry we consider two very important events and that may explain the variation in share prices of sporting companies: sporting performance and financial performance. According to Szymanski (2001), we can take the assumption as a club

whose shares are quoted is to achieve the maximization of profits, or the financial performance. However, the empirical study of Gerrard (1995) showed that there was no difference in the ranking of objectives of financial and sporting performance between English clubs listed and unlisted.

The financial statements report information on events in the last financial year. Consequently, the reading and interpretation of that information could help to change the share prices of sporting companies. In the absence of some other event, the share prices only change to the disclosure of the information contained in financial statements.

Another event that may contribute to changes in share prices is the sporting performance. Renneboog and Vanbrabant (2000) conducted one of the first studies on the impact of sports results in the evolution of the share price of English clubs. Unlike the losses and draws, the victory in a game produces in the follow day an abnormal stock returns almost 1%, according to CAPM. Zuber et al. (2005) conducted another study that examined the impact of sporting performance in profitability and volume of transactions of shares of English football clubs. Based on data for 10 clubs in the years 1997 to 2000 and OLS Model, these authors found the lack of relationship between sporting performance and stock return. Berument et al. (2006) verified the existence of a positive relationship between stock return and sporting performance only for one of three major Turkish clubs. Already in the empirical study of Duque and Ferreira (2007), it was found that this relationship existed for all Portuguese clubs quoted on the stock exchange in the period 1998 to 2003. According to the study of Boide and Farsano (2007), the stock return of Italian clubs calculated after a victory is higher compared to the situation when the club

loses. Thus, this study shows that investors make decisions in managing their investment portfolios in function of sporting results.

Win games and competitions, the quality of the team and the games, helps to change the expectations of investors on shares prices of sports clubs. Success in pitch can lead to higher advertising revenues, increased sales of products for merchandising, greater awareness of the brand, i.e. a greater capacity to create value for investors.

Furthermore, the sport results influence the state of mind of investors (Edmans, Garcia & Norli, 2007) causing human reactions that lead to feelings of optimism or pessimism. This is in line with the topics studied in behavioral finance on emotional factors that may influence the formation of expectations about the asset prices. Consequently, the influence on the psychological behavior of investors leads to the purchase or sale of shares of sporting companies, especially in countries like England where people live football. Therefore, in the absence of any other event, it is expected that the share price of sporting companies to track the evolution of the sport results. In this context, the literature leads us to state the following research questions:

Research question 2*:* Does sport performance influence stock market performance?

Research question 3*:* Does financial performance influence stock market performance?

Data

In the study of the first research question we considered the data for the English clubs who competed in the Premier League between the 1995/96 and 2006/07 seasons. The 1995/96 season is characterized by being the first time that 20 clubs

competed in the Premier League and reflected the first effects of the Bosman law. The second research question, the sample is formed by a set English football clubs selected based on two criteria: (1) the shares representing the capital of football clubs are or have been listed on London Stock Exchange (LSE) and/or Alternative Investment Market (AIM), and (2) the clubs had at least participated in the Premier League sometime during the 1995/96 to 2006/07 seasons.

The sports and financial data used were obtained from various editions of the Annual Review of Football Finance, published by Deloitte & Touche (several years), Internet sites containing information about the sports results of football matches (www.soccerbase.com and www.soccerstats.com), and through the Bloomberg's database. Although there are various sources to build the database that was used in this empirical study, some financial data has not been possible to obtain at certain times for some clubs (Middlesbrough, Crystal Palace and Leicester City). Data about share prices of Arsenal show a title with few transactions, so we decided not to include this club in the study of the second and third research questions. In this context, the sample size on the first and second and third research question is, respectively, 235 and 96 observations relate to the seasons 1995/96 to 2006/07.

The purpose of this study is to analyze the presence or absence of relationship between financial, sporting and stock market performance. The financial performance was analyzed based on accounting information reported in various editions of the Annual Review of Football Finance (Deloitte & Touche, several years). These longitudinal data are expressed in thousand of Pounds (£ '000) and were deflated by the GDP deflator and denoted at constant 2003 prices. The information contained in the Profit and Loss Account highlights the economic and financial performance. Thus, we selected the following indicators as possible

representatives of financial performance: Turnover, Wages and Salaries, Other operational costs before player trading, Net transfer fees, Amortizations of players registration, Net profit related with sale of player registrations, Other net income.

Until the 1997/98 season, most clubs recognized the full amount paid in the acquisition of sports rights of players in the Profit and Loss Account in the period in which the transaction occurred. From the 1998/99 season with the publication of Financial Reporting Standard (December 1998), the clubs started to record this amount as intangible assets and amortized over the contract period. For this reason, there is no data for the variables Amortizations and Net Profit Related with Sale of Players Registrations for the seasons 1995/96 and 1996/97.

Similar to Koning (2003), we used as an indicator of sporting performance that was the mean score obtained by the club in all official competitions in which it participated over a season. The victory was valued in the game with 3 points and tied with 1 point (similar to what happens in championships or in the group stage of the UEFA competition). Some studies use the total points scored in the competition as a measure of sporting performance (Barros & Leach, 2006) or the final league ranking (Szymanski & Kuypers, 1999). However, in this study we considered the average score because it is a different format from the competitions in question (e.g. number of the games, games with various phases to elimination).

Additionally, we considered the importance of the competition in which the points were obtained, as is made in the ranking of clubs by the International Federation of Football History and Statistics. Thus, we considered 33.33% and 85% of the average score, respectively, on the English competition to eliminate (FA Cup and League Cup) and international tournaments (UEFA Cup and Cup Winner's Cup when it existed). Thus, we seek to incorporate in the model the consensus that exists in the

literature (Hoehn & Szymanski, 1999) that the revenue depends on the degree of competitive balance between participants.

In addition to points earned in games, was also valued the classification obtained by the club in these competitions. Sometimes, contracts with sponsors or premiums to be paid to technical staff and players were subject to the classification obtained. Therefore, we used the following factors bonus (similar to that UEFA made in its ranking of clubs): Premier League, 3 points for win, 2 points for second place, and 1 point for third place; English FA Cup, English League Cup and UEFA tournaments, 3 points to reach the final, 2 points to reach the semi-final, and 1 point to reach the quarter-finals.

The stock performance is represented by two variables: i) annual average return of the shares of the various clubs calculated from daily returns, ii) the equity risk of the various clubs represented by the standard deviation of return. The daily return of share of the i-th club was calculated using the logarithm of the ratio between the price at the time t and price at the time t-1, as follows:

$$r_{it} = \ln\left(\frac{P_{it}}{P_{i,t-1}}\right) \times 100$$

We obtained the daily prices of shares for the same period are reported the annual financial data from each of the clubs.

Table 2 summarizes the financial, sporting and stock market variables used in empirical study. Figure 1 illustrates the path diagram of the hypothesized model.

[Insert Table 2 in here]

[Insert Figure 1 in here]

Structural Equation Modeling

Structural equation modeling (SEM) is used to analyze the football data using a two stage procedure (Hair, Black, Babin, Anderson & Tatham, 2006): the analysis of the measurement model and the analysis of the structural model. The measurement model specifies the rules of correspondence between latent and observed (measured) variables. The structural model examines all the relationships among the constructs or latent variables.

Most empirical studies using SEM techniques seem to fail the assumption of multivariate normality (see, for instance, Breckler, 1990; West, Finch & Curran, 1995). As noted by Hair et al. (2006) among others, the sampling error's impact due to non-normal data can be minimized as sample size increases. Moreover, to ensure stable solutions under non-normal data, we must consider a sufficient sample size in SEM models containing constructs with three or more measured indicators (observed variables) and with high or moderate high variable communalities. Alternatively, we may use a procedure known as the "bootstrapping" procedure (Byrne, 2001; Kline, 1998; West et al., 1995) in which the researcher randomly selects multiple subsamples from the original data, normally with the sample size as the original, and examines the parameter distributions and indexes of model fit to each one of these samples. The "bootstrapping" procedure is also useful to overcome the difficulties of small sample sizes (Zhu, 1997).

In our study, we use the maximum likelihood method to estimate the parameters in SEM with software AMOS. Because of the moderate sample size (N=196) and non-normal data of some variables, we check the test results with the "bootstrapping" procedure discussed in Byrne (2001). We examine bootstrap distributions and indexes of fit based on 1,000 samples. The bootstrap distributions of the test

statistics indicate that the structural equation modeling is consistent with the sample data.

The measurement model

In the first stage, we performed a confirmatory factor analysis to test separately how well observed variables TNV, W&S, OOC, AMT, NPP, ONI, INV represent the latent construct or factor 'financial performance' and how well observed variables PL, FA, LG and EU represent the latent construct 'sporting performance'. As the latent construct 'stock market performance' has only two measured variables (RET and RISK), a measurement model for this construct is underidentified. Thus, a unique solution cannot be found since there are four parameters to be estimated (two factor loadings and two error variances) and there are only three variance and covariances).

We computed the factor loading estimates and their associated squared multiple correlations (SMC) by maximum likelihood method. Standardized loading estimates should be 0.5 or higher to suggest convergent validity. We then computed the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The KMO measure takes values between 0 and 1. It should be greater than 0.5 for a satisfactory factor analysis to proceed. For further details, see Hair et al. (2006). The results from fitting the two measurement models are shown in Table 3.

[Insert Table 3 in here]

In the case of the financial measurement model, the KMO value of sample adequacy (0.758) suggests that the model is appropriate for the observed variables. As the

NPP and ONI variables have loading estimates less than 0.5 (0.147 and -0.325) and consequently very small squared multiple correlations (0.101 and 0.138), these variables will be removed from the 'financial performance' latent construct. In the case of the sporting measurement model, the KMO value (0.554) exceeds the required cutoff value for factor analysis to proceed. The loading estimates of FA and LG variables, however, were less than 0.5. Thus, these two variables will be deleted from the 'sporting performance' latent construct.

We computed the factor scores of each individual observation (team) on the derived financial and sporting factors. Such scores were obtained as a linear combination of the standardized observations by the regression method (see Jonhson & Whichern, 2007, p. 516-517). We then computed the linear correlations among stock markets variables (RET and RISK), financial (FINANC) and sporting (SPORT) factor scores for football teams quoted in LSE and AIM. The results are shown in Table 4.

[Insert Table 4 in here]

From the correlation matrix, it can be seen that correlations between FINANC and SPORT and between FINANC and RET are statistically significant at the 1% level (the correlation between SPORT and RET is only statistically significant at the 10% level). At the conventional significance levels, RISK shows no correlation with FINANC or SPORT. The results show that investors in shares of football clubs consider to some extent the financial information and sporting performance. Although there is a correlation between RET and Finance, the results indicate that this relationship is moderate. Thus, the assumption of Szymanski (2001) that the clubs listed have as main objective the maximization of profits is not supported by

the results of our study. Moreover, the existence of a moderate correlation between RET and SPORT contradicts the results of the study of Zuber et al. (2005). This may be due to the fact that this study considered a period of 4 years (1997-2000) and a dummy variable for participation in cup games (national and UEFA).

In order to investigate causal relationships, we performed a linear regression analysis using the financial and sporting factor scores as independent variables (or predictors) and stock market performance (return or risk) as the dependent variable. Results are presented in Tables 5 and 6.

[Insert Table 5 in here]

[Insert Table 6 in here]

As the financial and sporting factor scores are highly correlated or collinear, it is difficult to separate the individual effects of FINANC and SPORT on the dependent variable (RET or RISK). This means that the OLS (ordinary least squares) estimators may have large variances and covariance, and consequently the corresponding t-statistics are statistically insignificant in the multiple regressions. One of the remedial measures to address this collinearity problem is to drop one of the collinearity variables. Thus, in our multiple regression for RET, when we drop SPORT (FINANC), we obtain a single regression in which FINANC (SPORT) is now statistically significant at the 1% (10%) level. In the other hand, in our multiple regression for RISK, when we drop SPORT (FINANC), we obtain a single regression in which FINANC (SPORT) is statistically insignificant at the conventional levels. The results show that the increased of 1% in FINANC (SPORT) of the English clubs had a positive effect of 0.12% (0.098%) in RET.

The structural model

In the second stage, we perform the analysis of football data using the structural model, by specifying the relationships between the sporting and financial performance constructs, as shown in Figure 2. The variables within each latent construct follow the confirmatory data analysis.

[Insert Figure 2 in here]

We computed three types of fit indices for the structure model: Chi-square (χ^2) and the Goodness-of-Fit Index (GFI) measures for overall model fit; Comparative Fit Index (CFI) and Tukey-Lewis Index (TLI) for model comparison; and the Adjusted Goodness-of-Fit (AGFI) to measure model parsimony. A non-significant χ^2 statistic indicates the model fits the data well. The GFI, AGFI, CFI and TLI measures range from 0 to 1, with values close to 1 being indicative of good fit. A value >0.90 indicates a well-fitting model (Sharma, 1996). In addition to evaluating model fit, we computed the modification indices for every possible relationship for which no estimate was obtained. The software AMOS provides the modification indices and parameter change statistics for error covariance and for the regression weights, indicating how model fit could be improved by freeing the parameters.

Analysis of the results for the structural model in Figure 2 indicates an unacceptable model according to common fit indices (GFI=0.810, AGFI=0.591, CFI=0.889 and TLI=0.821). The modification indices and the expected changes statistics suggest misspecification of error covariance parameters between terms *e*2 and *e*4 (associated with observed variables W&S and AMT), *e*4 and *e*7 (associated with

AMT and INV), and *e*1 and *e*9 (associated with TNV and AMT). As a consequence, we decide to revise the model with the AMT variable deleted. The final structural model is shown in Figure 3. Table 7 shows the results of the SEM estimation.

[Insert Figure 3 in here]

[Insert Table 7 in here]

The fit indices strongly indicate that the two-construct model fits very well the sample data. In particular, the GFI, CFI and TLI values are greater than 0.95. There is a very high correlation between the sporting and financial latent constructs (0.946). This result corroborates the opinions of Vrooman (2000) and Szymanski and Kuypers (1999) that managers of English clubs try to achieve simultaneously financial and sports objectives. If managers were concerned to maximize the profits it would not be expected that the correlation between financial and sporting performance were so strong. The factors loading in Table 3 show that there is a strong correlation between the variables TNV, W&S, OOC and Financial Performance factor. Thus, we conclude that there is a strong relationship between the three observable variables, that is, the variables have a very similar behavior. During the period, the revenues were spent by English clubs in the acquisition of players and improvement of W&S (players and technical staff) in order to increase their sporting performance. The growth of ratio between W&S and TNV (62% in the 2005/06 season against 48% in season 1992/93), conjugate with the effect of amortization of the sport rights of players has contributed to only 9 of the 20 Premier League clubs have made a pre-tax profit in 2006. Although the clubs' revenues are increasing, the football club failed to increase proportionately the income offered to shareholders. Thus, this study corroborates the

opinions of Gerrard and Dobson (2000) and Morrow (1999) that the sports managers seek to achieve a minimum level of profit and maximize sporting performance. Even in situations where the club is owned by a group of investors, the objectives do not change. The objective of profit maximization stated by economic theory for the company is replaced by a financial goal of ensuring sufficient revenues to cover operating costs and invest in the acquisition and maintenance of the best players.

Cross-correlation Analysis

The cross-correlation function is a useful measure of association and direction of dynamic relationship between two time series variables, *Y* and *X* at lag *k*=0, ±1,±2,…. For a given set of time series data, the cross-correlation function is given by

$$R_{XY}(k) = \frac{C_{XY}(k)}{S_X S_Y},\ k = 0,\pm 1,\pm 2,\ldots,$$

where

$$S_X = \sqrt{\frac{1}{N}\sum_{t=1}^{N}\left(X_t - \overline{X}\right)^2} \text{ and } S_Y = \sqrt{\frac{1}{N}\sum_{t=1}^{N}\left(Y_t - \overline{Y}\right)^2}$$

are the standard deviations of *X* and *Y*, and

$$C_{XY}(k) = \begin{cases} \frac{1}{N}\sum_{t=1}^{N-k}\left(X_t - \overline{X}\right)\left(Y_{t+k} - \overline{Y}\right), & k = 0,1,2,\ldots \\ \frac{1}{N}\sum_{t=1}^{N+k}\left(Y_t - \overline{Y}\right)\left(X_{t-k} - \overline{X}\right), & k = 0,-1,-2,\ldots \end{cases}$$

is the cross-covariance function. $R_{XY}(k)$ has positive lags if *X* series leads *Y* series and negative lags if *X* series lags *Y* series (for more details, see Box, Jenkins & Reinsel, 1994).

We perform cross-correlation analysis between sporting and financial performance for the football clubs which maintained unbroken league membership between 1995 and 2007. Table 8 exhibits statistically significant cross-correlations within the group of 8 clubs (Arsenal, Aston Villa, Chelsea, Everton, Liverpool, Manchester United, Newcastle and Tottenham) for each pair of financial (TNV, NPP, INV and WS) and sporting (PL, FA, LG and EU) indicators at lags 0, +1, +2, +3. Critical values at the 5% level were computed as $\pm 2/N^{0.5}$, where N is the number of observations.

[Insert Table 8 in here]

The cross-correlations between sporting and financial time series show that EU is strongly contemporaneously correlated with TNV within the group of the four major clubs (Arsenal, Chelsea, Liverpool and Manchester United). These clubs have participated regularly in recent years in the Champions League, which highlights the importance of this competition in turnovers, reflecting the effect of sports results in financial performance. We note that the sporting performance in Premier League is positively correlated with the net profit related with sale of player's registrations for Tottenham Hotspur and Newcastle United.

For the majority of the clubs, the cross-correlations between PL and TNV are not statistically significant at the 5% level. The exception is Chelsea, in which the positive PL values tend to be associated with positive TNV values at the same time period. This can be explained by sporting achievements in recent years that were accompanied by an increase in revenue. Thus, the results fail to corroborate for the remaining 7 clubs the principle expressed by Szymanski (1998) and Szymanski and Kuypers (1999) that *better league performance leads to higher revenue.*

We also see in the case of Chelsea that the current investment in new players is strongly positively correlated with present and future performance in Premier League but not with present and future performance in UEFA competition. On the other hand, still considering the case of Chelsea, there is a strong relationship between current player's wages and current Premier League and UEFA performance. With the exception of Aston Villa and Chelsea the results fail to corroborate the principle expressed by Szymanski (1998) and Szymanski and Kuypers (1999) that *increase wage expenditure leads to better league performance*.

From cross-correlation analysis, we also found a strong positive relationship between net transfer fees and League Cup and UEFA performance for Tottenham, and a strong negative relationship between player's wages and Premier League and UEFA performance for Aston Villa. This is not totally surprising, since, for instance in 2004-2005 season, Aston Villa rank 10th in the Premier League and spent approximately £33 million on wages, while in the following season rank 16th and spent approximately £38 million.

Conclusions

The recent history of European and English football is marked by the occurrence of a number of phenomena that produce effects on the ability of clubs compete with each other and able to generate profits to attract new investors, to be reinvested in the purchase of new players, improve salaries and infrastructure. During this period, we have cases of emblematic clubs that have gone bankrupt (e.g. Leeds United), clubs win the national championship but show losses (e.g. Afc Ajax during 2001/02) and clubs who have dispersed their capital in the market and who have seen recently its shares to be acquired by large investors (e.g. Manchester United). In this context it is

necessary understand if the football clubs need to be profitable and if money can buy sporting performance.

This empirical study aims to study whether sports managers of English clubs who participated in the Premier League over 12 seasons, conciliating get a good sporting performance with financial performance. In parallel, we analyzed the influence of sporting performance and financial performance in the stock market performance of the clubs who are or have been listed on the LSE or AIM during the period under review.

In this study, structural equation model was used to analyze relationship between the three constructs early mentioned. This methodology present some advantages compared to the more commonly used techniques in studies about this field, such as regression analysis and DEA. Additionally, in the level of sporting performance, we considerate sports results obtained in national and UEFA competitions.

The main conclusion to be drawn from this study is that the managers of English football clubs sought to combine sporting performance with financial performance. The high degree of correlation estimate (0.95) between the two constructs to corroborate the view of Vrooman (2000) that managers try to achieve simultaneously financial and sports objectives. Another interesting result is that the association between Turnovers and major competitions (Premier League and UEFA) is stronger compared with wages and salaries. In fact, the increase in turnovers has been accompanied by a marked increase in operational expenses.

Although in recent years the revenues of clubs are increasing, the football club failed to increase proportionately the wealth (income generated) offered to shareholders. Thus, this study to corroborate the opinion of Gerrard and Dobson (2000) that the sports managers seek to achieve a minimum level of profit and maximize sporting

performance. Even in situations where the club is owned by a group of investors, the objectives do not change. The objective of profit maximization stated by economic theory for the company is replaced by a financial goal of ensuring sufficient revenues to cover operating costs and invest in the acquisition and maintenance of the best players.

As regards the directionality of the relationship, the study shows that good performance in UEFA club has immediate positive Turnovers in the four major English clubs. In the case of Chelsea the causality also includes the positive contemporary effect of the performance in the Premier League in their Turnovers. For Manchester United and Liverpool we highlight the lack of causality between sporting performance with investment in new players and costs of wages and salaries. Thus, the study contradicts the results of previous study of Dobson and Goddard (1998) which reveal that financial performance has a positive effect on sporting performance.

Finally, the study reveals a moderate correlation between stock market return and financial performance and sporting performance. This is a signal that some of the observed variables are considered by investors or there other factors that explain stock returns.

References

Arnold, A. J. (1991). An industry in decline? The trend in football league gate receipts. *The Service Industries Journal*, 11, 179-188.

Audas, R,, Dobson, S. & Goddard, J. (2002). The impact of managerial change on team performance in professional sports. *Journal of Economics and Business*, 54, 633-650.

Barajas, A., Fernández-Jardón, C. & Crolley, L. (2007). Does sports performance influence revenues and economic results in Spanish football?. *Working Paper Series*, available at SSRN: http://ssrn.com/abstract=986365

Barros, C. P. & Santos, A. (2004). Eficiência desportiva e eficiência económica no futebol português. *Revista Portuguesa de Gestão de Desporto*, 1, 12-23.

Barros, C. P. & Leach, S. (2006). Performance evaluation of the English premier football league with data envelopment analysis. *Applied Economics*, 38, 1149-1458.

Berument, H., Ceylan, N. B. & Gozpinar, E. (2006). Performance of soccer on the stock market: evidence from Turkey. *The Social Science Journal*, 43, 695 – 699.

Boido, C. & Fasano, A. (2007). Football and mood in Italian stock exchange. *The Icfai University Journal of Behavioral Finance*, 4, 32-50.

Boscá, J. E., Liern, V., Martínez, A. & Sala, R. (2009). Increasing offensive or defensive efficiency? An analysis of Italian and Spanish football. *Omega – The International Journal of Management Science*, 37, 63-78.

Box, G., Jenkins, G. & Reinsel, G. (1994). *Time Series Analysis: Forecasting and Control* (3th ed.). New Jersey: Prentice-Hall.

Breckler, S. J. (1990). Applications of covariance structure modelling in Psychological: Cause for concern?. *Psychological Bulletin*, 52, 260-271.

Bruinshoofd, A. & Weel, B. T. (2003). Manager to go? Performance dips reconsidered with evidence from Dutch football. *European Journal of Operating Research*, 148, 233-246.

Buraimo, B., Forrest, D. & Simmons, R. (2007). Freedom of entry, market size, and competitive outcome: Evidence from English soccer. *Southern Economic Journal*, 74, 204-213.

Byrne, B. M. (2001). *Structural Equation Modeling With AMOS: Basic Concepts, Applications and Programming*. New Jersey: Lawrence Erlbaum Associates Inc. Publishers.

Carmichael, F. & Thomas, D. (1995). Production and efficiency in team sports: an investigation of rugby league football. *Applied Economics*, 27, 859-869.

Carmichael, F. Thomas, D. & Ward, R. (2000). Team performance: The case of English premiership football. *Managerial and Decision Economics*, 21, 31-45.

Dawson, P. & Dobson, S. (2002). Managerial efficiency and human capital: An application to English association football. *Managerial and Decision Economics*, 23, 471-486.

Deloitte & Touche (several years). *Annual Review of Football Finance*, Manchester, UK.

Deloitte & Touche (2007), *Football money league*. Retrieved from http://www.deloitte.co.uk/sportsbusinessgroup

Dobson, S. M. & Goddard, J.A. (1998). Performance and revenue in professional league football: evidence from Granger causality tests. *Applied Economics*, 30, 1641-1651.

Dobson, S. & Goddard, J. (2004). Revenue divergence and competitive balance in a divisional sports league. *Scottish Journal of Political Economy*, 51, 359-376.

Duque, J. & Ferreira, N. A. (2007). Explaining share price performance of football clubs listed on the Euronext Lisbon. *Working Paper Series,* Retrieved from http://ssrn.com/abstract=675633.

Edmans, A., Garcia, D. & Norli, O. (2007). Sports sentiment and stock returns. *The Journal of Finance*, 62, 1967-1998.

Fama, E. F., Fisher, L., Jensen, M. C. & Roll, R. (1969). The adjustment of stock prices to new information. *International Economic Review*, 10, 1-21.

Gerrard, B. (2005). A resource-utilization model of organizational efficiency in professional sports teams. *Journal of Sport Management*, 19, 143-169.

Gerrard, B. & Dobson, S. (2000). Testing for monopoly rents in the market for playing talent. *Journal of Economic Studies*, 27, 142-164.

Haas, D. J. (2003). Productive Efficiency of English football teams – a data envelopment analysis approach. *Managerial and Decision Economics*, 24, 403-410.

Haas, D. J., Kocher, M. G. & Sutter, M. (2004). Measuring efficiency of German football teams by data envelopment analysis. *Central European Journal of Operations Research*, 12, 251-268.

Hadley, L., Poitras, M., Ruggiero, J. & Knowles, S. (2000). Performance evaluation of National Football League teams. *Managerial and Decision Economics*, 21, 63-70.

Hair, J. F., Black, W., Babin, B. J., Anderson, R. E. & Tatham, R. L. (2006). *Multivariate Data Analysis* (6th ed.). Upper Saddle River, New Jersey: Prentice-Hall.

Heij, R., Vermeulen, P. & Teunter, L. (2006). Strategic actions in European soccer: do they matter?. *The Service Industries Journal*, 26, 615-632.

Hoehn, T. & Szymanski, S. (1999). The americanization of European football. *Economic Policy*, 28, 205-240.

Hope, C. (2003). When should you sack a football manager? Results from a simple model applied to the English Premiership. *Journal of the Operational Research Society*, 54, 1167-1176.

Kern, M. & Sussmuth, B. (2005). Managerial efficiency in German top league soccer: an econometric analysis of club performances on and off the pitch. *German Economic Review*, 6, 485-506.

Kesenne, S. (2007). The peculiar international economics of professional football in Europe. *Scottish Journal of Political Economy*, 54, 388-399.

Kline, R. B. (1998). *Principles and Practice of Structural Equation Modeling*. New York: The Guilford Press.

Koning, R. H. (2003). An econometric evaluation of the effect of firing a coach on team performance. *Applied Economics*, 35, 555-564.

Morrow, S. (1999). *The New Business of Football: Accountability and Finance in Football*. Houndmills: Palgrave Macmillan.

Ozawa, T., Cross, J. & Henderson, S. (2004). Market orientation and financial performance of English professional football clubs. *Journal of Targeting, Measurement and Analysis for Marketing*, 13, 78-90.

Pinnuck, M. & Potter, B. (2006). Impact of on-field football success on the off-field financial performance of AFL football clubs. *Accounting and Finance*, 46, 499-517.

Pritamani, M. & Singal, V. (2001). Return predictability following large price changes and information releases. *Journal of Banking & Finance*, 25, 631-656.

Quirk, J. & El-Hodiri, M. (1974). The economic theory of professional sport league, in: *Government and Sport Business* (Edited by R. Noll), The Brookings Institution, Washington D.C., 33-80.

Renneboog, L. & Vanbrabant, P. (2000). Share price reactions to sporty performances of soccer clubs listed on the London stock exchange and the AIM. *Discussion Paper n.º 19*, Center for Economic Research.

Scully, G. W. (1994). Managerial efficiency and survivability in professional team sports. *Managerial and Decision Economics*, 15, 403-411.

Sharma, S. (1996). *Applied Multivariate Techniques*. New York: John Wiley & Sons, Inc..

Simons, R. (2000). *Performance Measurement and Control Systems for Implementing Strategy*. Upper Saddle River, New Jersey: Prentice-Hall**.**

Sloane, P. (1971). The economics of professional football: the football club as a utility maximize. *Scottish Journal of Economy*, 17, 121-145.

Szymanski, S. (1998). Why is Manchester United so successful?. *Business Strategy Review*, 9, 47-54.

Szymanski, S. (2001). Income inequality, competitive balance and the attractiveness of team sports: some evidence and a natural experiment from English soccer. *The Economic Journal*, 111, 69-84.

Szymanski, S. & Kuypers, T. (1999). *Winners and Losers: The Business Strategy of Football*. London: Viking.

Thompson, R. B., Olsen, C. & Dietrich, J. R. (1987). Attributes of news about firms: an analysis of firm-specific new reported in the Wall Street Journal Index. *Journal of Accounting Research*, 25, 245-274.

Vrooman, J. (1997). A unified theory of capital and labor markets in major league baseball. *Southern Economic Journal*, 63, 594-619.

Vrooman, J. (2000). The economics of American sport leagues. *Scottish Journal of Political Economy*, 47, 364-398.

West, S. G., Finch, J. F. & Curran, P. J. (1995). Structural equation models with nonnormal variables: Problems and remedies. In R. H. Hoyle (Ed.). *Structural Equation Modeling: Concepts, Issues, and Applications* (p. 56-75). Thousand Oaks, CA: Sage.

Zhu, W. (1997). Making bootstrap statistical inferences: A tutorial. *Research Quarterly for Exercise and Sport*, 68, 44-55.

Zuber, R. A., Yiu, P., Lambc, R. P. & Gandar, J. M. (2005). Investor–fans? An examination of the performance of publicly traded English Premier League teams. *Applied Financial Economics*, 15, 305-313.

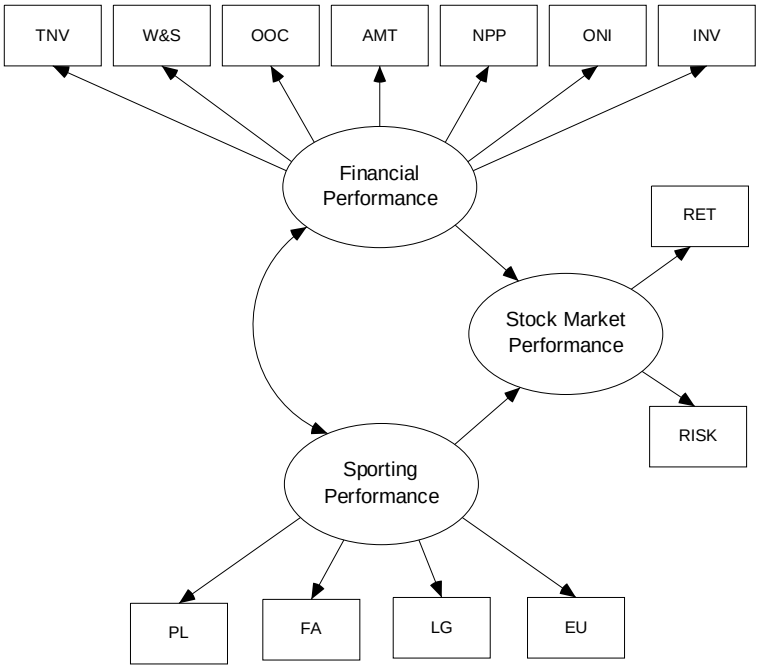

Figure 1: Hypothesized model of sporting, financial and stock-market constructs

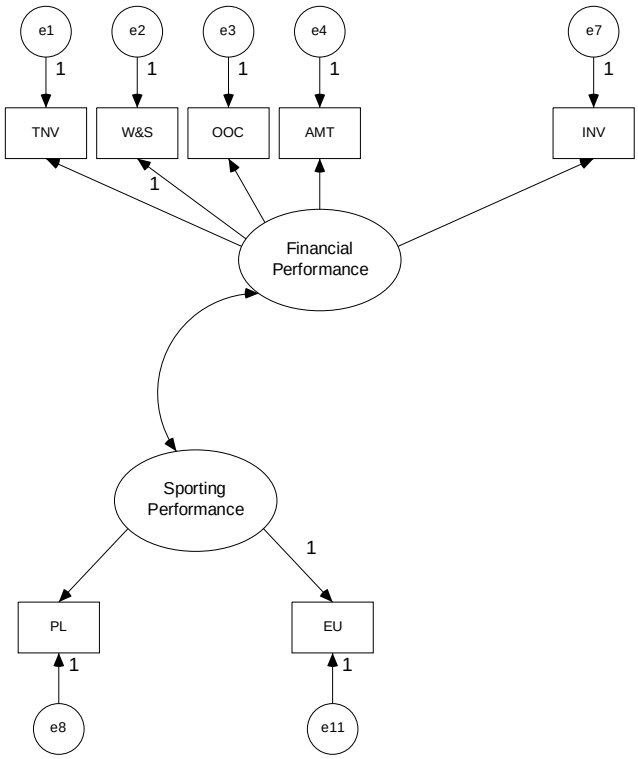

Figure 2: Diagram path for the structural model

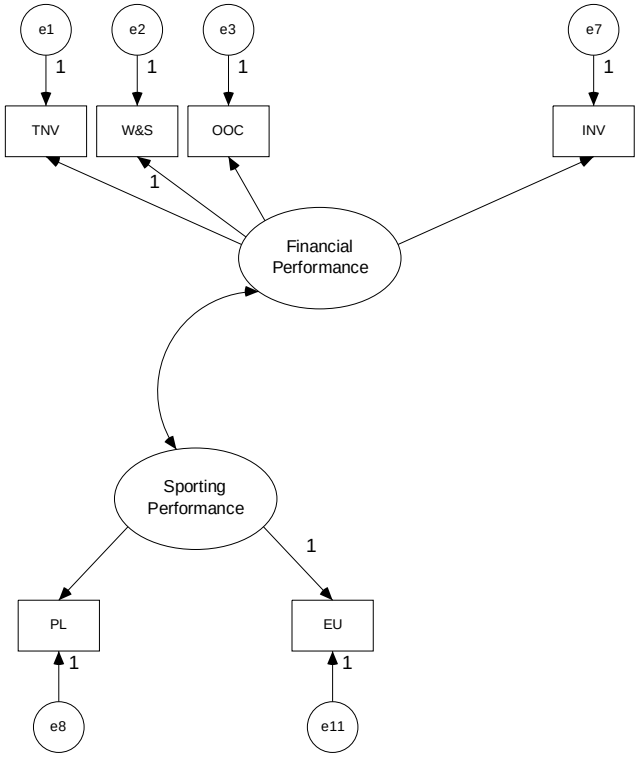

Figure 3: Diagram path for the final model

Table 1: Empirical studies about performance in football

Paper	Country	Variables	
		Input	Output
Haas (2003)	England	Wages and salaries for players and coaches, home town population	Points obtained in the domestic league, attendance, total revenue and participation in international tournaments (dummy variable)
Barros and Santos (2004)	Portugal	Supplies and services, wages, amortizations, other costs, number of players	Match day, quota, broadcasting, transfer fees, financial revenue, points obtained in the domestic league and attendance
Haas et al, (2004)	Germany	Wages and salaries for players and coaches	Points obtained in the domestic league, attendance, total revenue and participation in international tournaments (dummy variable)
Barros and Leach (2006)	England	Number of players, wages, net assets and stadium facilities expenditure	Points obtained in the domestic league, attendance and turnover

Table 2: List of variables in the hypothesized model

Variables	Code
FINANCIAL PERFORMANCE	
Turnover	TNV
Wages and salaries	W&S
Other operational costs before players trading	OOC
Net transfer fees	INV
Amortizations of players registration	AMT
Net profit related with sale of players registrations	NPP
Other net income	ONI
SPORTING PERFORMANCE	
Premier League	PL
English FA Cup	FA
English League Cup	LG
UEFA Competitions	EU
STOCK MARKET PERFORMANCE	
Stock return	RET
Risk	RISK

Table 3: Confirmatory factor analysis results for the measurement models

	Financial factor model			Sporting factor model		
Variable	Factor loadings	Square multiple correlations	KMO	Factor Loadings	Square multiple Correlations	KMO
TNV	0.975	0.937	0.692			
W&S	0.941	0.920	0.757			
OOC	0.954	0.896	0.801			
AMT	0.756	0.788	0.735			
NPP	0.147	0.101	0.571			
ONI	-0.325	0.138	0.852			
INV	0.531	0.462	0.867			
PL				0.940	0.447	0.535
FA				0.320	0.095	0.759
LG				0.070	0.016	0.221
EU				0.686	0.421	0.542
KMO measure			0.758			0.554

Table 4: Correlation coefficients between return, risk, sporting and financial factor scores

	FINANC	SPORT	RET	RISK
FINANC	1			
SPORT	0.81***	1		
RET	0.27***	0.17*	1	
RISK	0.01	-0.10	-0.11	1

* Significant at the 10% level ** Significant at the 5% level *** Significant at the 1% level

Table 5: Simple and multiple regressions of RET on financial and sporting factor scores

Variable	Coeficient	Standard error	t-statistic	p-value
FINANC	0.1142	0.0687	1.66	0.100
SPORT	0.0072	0.0737	0.10	0.923
Constant	0.0363	0.0442	-0.82	0.414
FINANC	0.1193	0.0445	2.68	0.009
Constant	-0.0363	0.0440	-0.83	0.411
SPORT	0.0983	0.0576	1.71	0.091
Constant	0.0244	0.0524	0.47	0.642

Table 6: Simple and multiple regressions of RISK on financial and sporting factor scores

Variable	Coeficient	Standard error	t-statistic	p-value
FINANC	3.7256	3.0050	1.24	0.218
SPORT	-5.0745	3.2230	-1.57	0.119
Constant	3.1194	1.9337	1.61	0.110
FINANC	0.1361	1.9742	0.07	0.945
Constant	3.1014	1.9498	1.59	0.115
SPORT	-1.9555	1.9994	-0.98	0.331
Constant	2.9336	1.8187	1.61	0.110

Table 7: Estimated results in the final model

Variable	Factor loadings		Square multiple Correlations
	Financial	Sporting	
TNV	0.990***		0.979
W&S	0.925***		0.855
OOC	0.951***		0.904
INV	0.501***		0.251
PL		0.816***	0.667
EU		0.806***	0.650
Model fit:	χ^2=22.234, d.f.=8, *p*-value=0,005 GFI=0.966 AGFI=0.910 CFI=0.988 TLI=0.977		
Factor correlation:	0.946		

* Significant at the 1% level ** Significant at the 5% level *** Significant at the 10% level

Table 8: Statistically significant cross-correlations between sporting and financial performance at lag *k*=0,1,2,3

	Sporting to Financial (+*k*)							
Team	PL→TNV	PL→NPP	FA→TNV	FA→NPP	LG→TNV	LG→NPP	EU→TNV	EU→NPP
Arsenal	—	-0.76 (0)	—	—	—	—	0.78 (0)	—
Aston Villa	-0.64 (0)	—	-0.58 (1)	—	—	-0.63 (0)	—	0.65 (0)
Chelsea	0.86 (0)	—	—	—	—	—	0.67 (0)	—
Everton	—	—	—	—	—	—	—	—
Liverpool	—	—	—	—	—	—	0.61 (0)	—
Manc. Utd	—	—	—	—	—	—	0.57 (0)	—
Newcastle	—	0.64 (2) 0.77 (3)	—	0.79 (0)	—	0.65 (3)	—	—
Tottenham	—	0.85 (0)	—	—	—	—	—	0.65 (0)
	Financial to Sporting (+*k*)							
Team	INV→PL	WS→PL	INV→FA	WS→FA	INV→LG	WS→LG	INV→EU	WS→EU
Arsenal	—	—	—	—	—	—	—	0.82 (0)
Aston Villa	—	-0.80 (0) -0.67 (1)	—	—	—	0.58 (1) 0.63 (2)	—	-0.67 (1) -0.60 (2)
Chelsea	0.61 (0) 0.63 (1)	0.86 (0)	—	—	—	—	—	0.61 (0)
Everton	—	—	—	—	—	—	—	—
Liverpool	—	—	—	—	—	—	—	—
Manc. Utd	—	—	—	—	—	—	—	—
Newcastle	—	—	—	—	0.63 (3)	—	—	—
Tottenham	—	—	—	—	0.66 (0)	—	0.80 (0)	—

Note: Cross-correlations are indicated in regular font and the corresponding time lags are in brackets**.**