The Football Market: Governance and Sporting Success of Top20 Football Clubs

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ABSTRACT---- ***The main aim of this paper concern the relationship between sporting success and economic variables. The issue of sporting success is not simply an aspect that is linked to the epic and immeasurable size of a sporting talent, which nevertheless still remains an inescapable element to success, but it must take its place alongside other issues such as the governance of clubs, investments, the system of regulations, the structure of a club's costs and profits. Sporting success therefore presents itself with a collective connotation and contributes to the increase of a team's long term value.***

1. INTRODUCTION

The arguments over the relationship between sporting success and economic variables have gone on for years. The case of football is surely the most interesting and even more important example from a quantitative point of view. Similar things could be said about other sports such as Formula 1 for example. The issue of sporting success is not simply an aspect that is linked to the epic and immeasurable size of a sporting talent, which nevertheless still remains an inescapable element to success, but it must take its place alongside other issues such as the governance of clubs, investments, the system of regulations, the structure of a club's costs and profits.

What we are referring to obviously concerns team sports, sports in which results do not depend on an individual's performance, but becomes the sum total of so many individual performances, even if in some cases with differing roles and responsibilities. Sporting success therefore presents itself with a collective connotation and contributes to the increase of a team's long term value.

2. THE EUROPEAN MARKET

Deloitte's 2009 report brings to light some interesting facts such as the European football market being worth €14.6 billion.

The five biggest football federations (the Big Five) alone control some 50% of the market with a turnover of €7.7 billion, an increase of 10% over the previous year. Of these *Big Five* it is the Premier League that tops the list having generated revenues of €2.4 billion taking advantage of the new agreements on television rights and leaving its foreign competitors lagging even further behind. This is something that becomes even more apparent with the exchange rate for Euro – Sterling. Spanish teams Barcelona and Real Madrid have recorded notable hikes in revenue, making them the third and first teams in the world for revenue volumes. These increases have meant that the Spanish Liga is now on an equal footing with the Bundesliga with €1,438 billion pushing it above Italy's Serie A that is next in line with €1,428 billion. Propping up the *Big Five* is French football that has recorded revenue volumes in the region of €1 billion. Of the five it is the Italian federation that has seen the greatest rise in its revenues with an increase of 34% shared almost equally between three types of revenue sources: merchandising, television rights and match day attendances. An analysis of the different teams shows that these percentages differ totally, with the Spanish teams and Bayer focussing on merchandising, the Italians on television rights and the English on stadium ticket sales. In general football shows itself to be a counter-cyclical sector that is growing even in the midst of an economic crisis.

There are two fundamental aspects that characterize this sector: illiquidity and intangibility.

A sports club's capital is essentially made up of the value of its athletes. That value is subject to severe fluctuation, caused by the physical condition and performance of the athletes. Furthermore, assessing that value is like assessing any other intangible asset. The product – the match played – is in itself an intangible asset.
These two characteristics give us a little insight into some of the problems that have arisen in recent years in sports management.

3. THE GOVERNANCE OF SPORTING ACTIVITIES

There is no doubt that the problem of the governance of sporting clubs and those of football clubs in particular is a central issue. This can basically be split into the following three different types of governance: entrepreneurial model of governance; association-type model of governance; patronage-based model of governance. The entrepreneurial model and the patronage-based model are those found mainly in Italy and England, whilst the association-type model constitutes the backbone of the Spanish system. The limitations of the entrepreneurial system are clear to see and are associated with: a) limited return on investments; b) the irrelevance of the club's capital and its easy depreciation; c) high running costs. The patronage based model is threatening to intoxicate the market because it allows some to invest without taking into account the returns on their actual investments and for objectives that are totally set apart from sport itself. Berlusconi's Milan is in this case very symptomatic of this. The association-type model appears to be the one that works the best if we consider that Real Madrid and Barcelona are among the first three clubs in the world in 2008 for revenue, and they operate on an association-type model. Nevertheless this model is too closely linked to specific territorial issues and is not easily exportable or generalizable. The football market therefore is also characterised by the confronting of these different operating models that are often decisive in sporting success or even failure. Buying and selling of players and the resultant strengthening or weakening of a team find different meanings and outcomes in the various operating models. The strengthening of a team is a way of boosting an image in the case of the patronage-type or contributing towards the election of a chairman in the case of the association-type. In the entrepreneurial model the weakening of a team can be an attempt to wipe out debts or eliminate annual losses.

Financial fair play in this context manifests itself as a regulatory mechanism that attempts to wipe out this starting point disparity, imposing a cap on spending and avoiding anyone splashing out extravagantly. The advantages of this system are greater long-term financial stability, less debt and a greater attention paid to the managing of the breeding grounds. The price that will have to be paid for these advantages will be in terms of the entertainment, for we will no longer see "star-studded" teams.

4. BAUMOL DISEASE AND A SIMPLE FINANCIAL FAIRPLAY RULE

The football sector appears to be suffering from a particular form of what is known as Baumol's disease.
In 1966, Baumol and Bowen drew attention to the fact that certain economic sectors, including that of the performing arts and healthcare sector are subject to continuous increases in costs.
This is due to the fact that productivity in these sectors does not increase or rather, it increases very little by comparison to other sectors in any given period.
If we include the entertainment sector as one of those subject to Baumol's disease, to all purposes sport, and specifically football, proves to be subject to this particular phenomenon.
The effect of Baumol's disease however, is different from the one displayed in the culture-related sectors. Negative growth in productivity, which in the case of cultural activities is caused by the rising costs of repeating the performance, in the case of sports-related activities is accentuated by the fact that competition between the various clubs, together with the need to achieve certain results, imposes higher and higher costs on the clubs. Additionally, the need to ensure the involvement of champions causes the number of signings to rise.
These reflections allow us to guess that the mainly financial recession that the football industry as a whole is currently going through is not an incidental factor, but rather a structural feature of the system, which in the absence of external corrective action will no doubt evolve towards bankruptcy. In this scenario, rules like financial fair play take on a new and important role. It is not a question of rules to correct a specific incidental state of affairs, but rather a way to correct the structure of the sector itself.
Since any form of public subsidy of the sector is ruled out *a priori*, given that by comparison to other sectors affected by Baumol's disease, such as culture and healthcare, it generates a low level of social capital, the solution to Baumol's disease must be sought in market mechanisms. Based on this, financial fair play is doubtless an attractive regulating mechanism. The option to exploit television rights is a special factor within the sector and to all intents and purposes can play an important role in substituting public funding or private donations. The system worked as long as the fees paid for television rights increased year by year. This created the illusion that the continuous growth in revenue generated by the rights would cover any management disasters. However, this growth could not be sustained and when the fees stopped increasing and in some cases began to decrease, the football industry as a whole went into recession.
In order to find a simple fair play rule, we need to try to create a model for the basis of football club profits.
We can express this using the formula below:

$\Pi = R-C-G+S-M \quad (1)$

Let R be total revenue, C costs linked to signings, S the non-operating incomes deriving from trading players, M the depreciation in the value of the players and G general costs.
Hence a simple fair play rule may be expressed as follows:

$R \geq C+G$ and $S \geq M$. (2)

This means that the clubs must abide by two rules, one linked to revenue and signing costs and the other to investments.

One of these rules may be temporarily broken if the sum

R-C-G+S-M≥0 (3)

In this manner, the long-term stability of football clubs would be guaranteed and the clubs would be incentivised to invest in academies and harness internal efficiency. If this were to occur, sporting success would be the result of proper and efficient management, which can only be an advantage to the game.

5. NEURAL NETWORKS AND THE PROBLEM OF PREDICTING SPORTING SUCCESS

Neural networks and architecture constitute one of the more recent and most interesting fields of research, fields that began originally with the study and research of artificial intelligence, but gradually spread to include other sciences. The approach based on "neural networks" is referred to as connectionist and allows us to think about the phenomena of learning and memory, as will be seen further on. The early concepts of this new science, known as neuroinformatics, are attributable to McCulloch and Pitts and the fundamental idea behind their work was to attempt to reproduce the cerebral structure, founded on neurons, axons and dendrites using a mathematical model. Every neuron receives electrical impulses from dendrites and retransmits them via axons. It is therefore possible, in principle, to imagine constructing a minute model of a cerebral structure using logical portals, easily describable using the rules of Boolean algebra. The neuron, therefore, is modelled as a logic portal that has the goal of modifying and retransmitting the signal, obeying a specific rule. The transmission of the signal depends on several parameters: on the internal status of the logic portal, on the status of the previous portals and the signal received. The output is determined by means of an activation function that can be linear, non linear or threshold and that depends on the type of decision that the system has to simulate or logical operations that the system is called upon to complete. A quick comparison with the cerebral structure reveals that the human brain has 100 billion neurons and each neuron approximately 10,000 synapses or connections. The brain's extraordinary capabilities are down to this enormous number of connections. Each neuron receives and processes information coming from other neurons producing an outgoing impulse that is sent, via the synapses, to the connected neurons. Synapses can be excitatory or inhibitory and every neuron is activated or inhibited depending on whether the overall stimulation does or does not exceed a certain threshold. An artificial neuron structure consists in a collection of nodes that make up the units of logical calculus (in a Boolean sense), connected by communication channels (synapses), that constitute the structure for storing data. Each neuron can have a g threshold and an s status. Synapses have a synaptic weight □ associated with them.

The system has three dynamic characteristics: activation, learning and iteration.

The first updates the status of the neurons, the second alters the weight of the connections and the third regulates the order of activation. A neural network is capable of learning a pre-arranged model. It is said that to do this the network is trained so that the introduction of an input can result in a desired output or one that is consistent with the same.

The training consists of presenting the neuronal network with a combination of inputs and as a result modifying the synaptic weights in such a way to obtain the considered outputs. The combination of models presented to the network during the learning phase is defined as a training set. The models used to confirm the level of learning are contained in the *validation set.*

The learning algorithms can be divided into two groups:

a) supervised;

b) unsupervised.

The first requires each input model to be associated with a desired output model. The training set therefore contains a lot of information about each of them. The network produces a calculated output for each model presented that is compared with that desired. Any error is transmitted back along the network, correcting the synaptic weights in accordance with a learning algorithm that tends to minimize the mentioned error. The training of the network comes to an end when a level is achieved for the calculated error that is compatible with a certain confidence interval previously established.

Unsupervised algorithms within the training set, on the other hand, contain only input models. Learning algorithms modify the synaptic weights to produce output carriers that are consistent. The training process therefore extracts the statistical properties of the training set and groups similar models into similar classes. An interesting feature of neural networks is that of being able to discern and extract a model of a general nature, even where it is distorted by noises. The neural networks can also adapt flexibly to situations that are complex and changeable in time.

The EBP (Error Back Propagation) learning algorithm is the best known and the fastest learning algorithm for supervised networks. It has a multi-layered structure, that is to say it has hidden layers. Each neurone is connected with that of the previous layers without horizontal connections. The EBP algorithm has two phases. In the first the signal is transmitted from the exterior towards the interior. In the second the direction is reversed.

A defined error can be calculated:

$$E_{\pi} = 1/2 \Sigma (t_{\pi j} - \sigma_{\pi j}) \quad (4)$$

where $t_{\pi j}$ and $\sigma_{\pi j}$ indicate respectively the anticipated output and the calculated output of the nth neuron. The output calculated for a generic neuron is the function of the contribution of the neurons connected with it:

$$\sigma_{\pi j} = f_j(net_{\pi j}) \qquad (5)$$

with f generally assuming the shape of a sigmoid.

$Net_{\pi j}$ represents the contribution of the associated neurons weighted with synaptic weights:

$$net_{\pi j} = \Sigma_i \ \pi_{ij} \ \sigma_{\pi j} \qquad (6)$$

The second phase consists in the correction of the synaptic weights with the aim of minimising the error.

Updating of synaptic weights follows this criteria:

$$\Delta_{\pi} = \varepsilon \ \delta_{\pi j} \sigma_{\pi j} \qquad (7)$$

with ε defined as the level of learning.

The application of neural networks in finance affects a large range of problems, some of which are extremely complex. The capacity and the characteristics of the networks allow a whole series of applications, from the simplest to the most complex. An interesting aspect is that associated with classification. The classification properties of a neural network constitute one of the richest fields for possible applications. By comparing this with the traditional methods of classification (*Discriminant Analysis*), commonly used in financial statistics, it is possible to show quite clearly how the use of neural networks results in greater levels of efficiency.

The main aim of using neural networks in this work will be to determine, using the discriminatory capabilities of an appropriately trained neural network, those teams that have a greater potential for sporting success in the years to come. The indicator that describes sporting success is identified by using the level of growth of the value of the team as a whole. In order to obtain this result a database has been put compiled containing information on the financial aspects (costs, revenue, and investments), operational aspects and sporting aspects of the top twenty European teams. The database constitutes the knowledge base from which the neural network will extract its forecasts in the form of a discriminatory analysis. This will allow us to attempt to forecast future successes on the basis of given variables of a varied nature, not just sporting but also financial and operational. For our purposes the sporting success is defined as "increasing in time of current value of the club". This analysis will also allow us, using the neural network, to identify those factors that are crucial for sporting success. We will in particular endeavour to respond to the question as to whether models based on "financial fair play" are effective and whether financial sustainability will become a limiter to both results and entertainment.

The following table summarises the values of some variables that are the subject of the analysis:

Tab.1.- Some financial indicators of Top20 Football Clubs

	Revenue 2006 EuroMIL	Revenue 2007 EuroMIL	Revenue2008 EuroMIL	Operating Income ($MIL)	Nursery	Debt/ Value	% Revenue Match DAY	% Revenue Mass Mesia	% Revenue Merchanidise	Current Value ($MIL)	1-Year value change %
Real Madrid	276	366	351	81	10	23	23	32	45	1353	5
Manchester United	246	325	315	160	10	54	42	29	29	1870	4
Barcelona	208	308	290	108	10	7	32	38	30	960	22
Chelsea	221	269	283	-13	8	92	38	37	25	800	5
Arsenal	171	264	264	80	8	107	32	42	26	1200	0
Milan	234	210	227	58	8	0	16	59	25	990	24
Bayern Monaco	190	295	223	59	8	0	38	0	62	1110	21
Liverpool	181	211	199	50	9	59	27	42	31	1010	-4
Inter	177	173	195	27	9	77	20	58	22	370	-8
Roma	132	175	158	69	8	9	21	58	21	381	-12
Tottenham	104	145	153	70	8	29	30	36	34	445	8
Juventus	229	168	145	46	9	5	10	54	36	600	18
Olympique Lyonnais	93	156	141	94	8	18	22	49	29	423	4
Newcastle	129	126	129	-13	8	96	41	32	27	285	-5

Hamburg	79	128	120	44	7	0	40	20	40	330	13
Schalke 04	97	148	114	41	7	38	24	17	59	510	9
Celtic	93	104	112	11	8	14	50	27	23	218	-4
Valencia	85	104	108	0	8	0	28	53	19	204	0
Olympique Marseille	79	104	99	20	7	0	30	40	30	240	28
Werder Brema	79	104	97	27	6	0	40	20	40	292	12

6. THE RESULTS OF THE NEURAL CLASSIFICATION AND CONCLUSIONS

The following table highlights the results of the neural network forecasts

Tab 2.- Neural Network Forecasts of Future 1-Year

value change	**%**
Real Madrid	5,0
Manchester United	4,7
Barcelona	5,8
Chelsea	6,6
Arsenal	7,3
Milan	7,9
Bayern Monaco	2,9
Liverpool	8,5
Inter	10,4
Roma	5,1
Tottenham	7,7
Juventus	7,6
Olympique Lyonnais	8,3
Newcastle	7,7
Hamburg	6,6
Schalke 04	6,0
Celtic	6,1
Valencia	7,7
Olympique Marseille	9,1
Werder Brema	8,2

As can be clearly seen, today's top teams shows lower growth levels compared to the up and coming teams, as though a catching up mechanism has kicked in.

These results are very interesting. A first consideration concern the so called “financial fair play”. The neural network analysis show that financial sustainability of football clubs will not become a limiter to both results and entertainment, but will be an incentive to invest in nursery and to program in the long-term. It is easy to win by purchasing the best champions. But this policy is more expensive and not always effective. It is a myopic policy. The football market need of perspective policy to achieve the long run success.

A second consideration concerns the critical factors of success in football market. A correct management of resources and a good technical competence is more important than the “intensity” of capital. In a period of financial crisis in all the world and in all the sectors this aspect is very important!

7. REFERENCES

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