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IS IT A BUSINESS FEEDING ON EMOTIONS OR AN ACT OF ALTRUISM? THE CASE OF FINANCING FOOTBALL IN POLAND

Abstract. The main goal of this article is to verify the hypothesis on the behavioural character of the relationships between enterprises financing football in Poland and the fans of this sport. In his research, the author analyses selected companies listed on the Warsaw Stock Exchange which are engaged in financing football in the Polish Ekstraklasa. The author uses the quotations of such companies as: Ruch Chorzow, Comarch, KGHM, Tauron, Lotos and Police. It is possible to divide these companies into three groups: owners (Comarch, KGHM), sponsors (Tauron, Lotos, Police) and one public company (Ruch). In the research, ARCH models are used based on econometric models with independent variables: sporting results and betting odds.

Key words: football, betting odds, emotions, ARCH type models.

1. INTRODUCTION

In their book *Soccernomics*, S. Szymanski and S. Kuper [2009] write about exposing the myths of football. They claim that one of the most popular myths is that football is a great business. If this is not true, then why does it attract so much money? According to Deloitte's report in 2014, the revenue of 20 of the world's biggest football clubs is likely to exceed 6 billion Euros. Therefore, the question arises of whether football is a business capitalising on the emotions or an altruistic businessperson's folly.

The purpose of this article is to verify the hypothesis of the behavioural character of the relationships of companies sponsoring football clubs with the clubs and their fans. The paper is to answer the following research questions:

1. Is football in Poland not profitable?
2. Do we confirm a company's success just by measurable profits or by intangible benefits as well?
3. Who gains what in the Polish football business?

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The analysis covers Polish listed companies that are engaged in sponsoring clubs from Ekstraklasa, the Polish top flight. The stock prices of the following are taken into consideration: Comarch, KGHM, Zaklady Chemiczne Police Grupa Azoty, Tauron, Energa and Lotos. The above companies fall into two groups: football club owners (Cracovia, Zaglebie Lubin), sponsors (Pogon Szczecin, Lechia Gdansk, Slask Wroclaw) as well as the only club listed on the stock exchange (Ruch Chorzow). For the purpose of this study, the author uses stock quotations, the clubs' sporting performance and betting odds recorded from 2008 to 2014.

2. FOOTBALL IN POLAND

The history of football in Poland started in the later part of the 19th century, when Poland was partitioned among three of the superpowers of the time. It was brought in by immigrant workers from Germany, Great Britain and other Western European countries. The first Polish national federation was the Polish Football Union (PZPN), founded in Krakow in 1919 [available at: http://www.pzpn.pl/federacja/historia]. Four years later, PZPN joined FIFA (International Federation of Football Associations) and, in the following year, 510 clubs, 17 thousand players and 200 referees were registered. The first league match was played in Warsaw on April 2 1927 and later that year the league competitions were legitimised. After the Second World War, PZPN was reactivated, which resulted in a change of names for the football clubs that 'gained' new sponsorship from state-owned companies. These were, textile (ŁKS, Garbarnia), railroad (Lech, Polonia), military (CWKS Legia) or militia teams (Wisla). Formally, sponsorship did not exist and team members were employed as workers in the companies that controlled the clubs. Therefore, the sport was theoretically amateur because, formally, the players were not paid for playing, even though they never appeared in their workplace. In 2005, the top league clubs and PZPN established Ekstraklasa, a company that has taken over top flight competitions. The reason for starting such a company was to enhance competition by promoting the league as well as to maximise club revenues. Ekstraklasa both organises football matches and coordinates the sales of media and marketing rights. Almost 80% of company profits are the revenues from the sale of TV broadcasting rights, the remaining part being marketing rights. Expenditure consists of 85% of the transfer of funds coming from individual contracts to clubs and 5% contributions to PZPN.

The analysis in this article covers six clubs whose stocks are owned by sponsoring companies and listed on the Warsaw Stock Exchange. As a next step, the financial standing of these clubs is presented according to their position in the Ernst & Young ranking of 2013.

The first to be presented is Slask Wroclaw, which came third in last years' Ekstraklasa playoffs. Even though this former Polish national champion failed to retain the title, its financial performance was a success. Its sponsor's (Tauron's) logo on the outfits was the most visible in Ekstraklasa and translated to the advertising equivalent of PLN 7 million. Advertisements displayed on the pitch--side barriers brought in another PLN 16.1 million, and the sale of club scarves – PLN 300,000. Unfortunately, despite its stadium capacity of 42 thousand, the club's matches were not very popular (the average of one round was about 3,000 season tickets, while stadium attendance in 2012/2013 was 34%). Disagreement between the club owners (Bithel Holding – 50.8% and the city council of Wroclaw – 49.2%) resulted in Sląsk's financial problems. In the season of 2013/2014, the Piast beer (Carlsberg) logo disappeared from the players' shirts and, at the end of the current season, Tauron is expected to withdraw from its sponsorship. The falling dynamics of the club's revenue and its growing liabilities have made its profitability ratio fall to –34.5%. This disastrous financial standing has had a negative effect on the club's performance – in the playoffs it ended up in the drop zone.

Another club sponsored by a stock company is Lechia Gdansk. The club finished the 2012/2013 season in the 8th position. It is sponsored by two listed companies, Energa and Lotos, whose logo on the players' shirts brought the advertising equivalent of PLN 4.6 million. However, despite its large stadium capacity, the club recorded attendance at a disappointing 31%. The fact that Lechia is owned by just one company (Wroclawskie Centrum Finansowe) clearly helps the club's financial performance (it was third in the E&Y financial ranking) and its sporting position, in the 2013/2014 season it was competing in the champion group. Relatively poor revenue dynamics led to a small loss, therefore its profitability ratio was –4.7%.

The next club is KGHM Zaglebie Lubin. It is fully owned by the KGHM stock company that provides the club with substantial material backing, thus allowing it to aspire to the top position. Unfortunately, its board's ambitions were not reflected in stadium attendance (a mere 44%) and the club's position in 2013/2014 was not satisfying. As a result of the fundamental round the club ended up in the drop zone and after a just a few matches it was a certain candidate for relegation. Due to the small capacity of its stadium, in 2012, the sponsor contributed as much as 75% to the club's PLN 41 million budget. This, and its poor revenue dynamics, resulted in a negative profitability ratio of –36.5%.

12th position in the season of 2012/2013 and 17th in the financial ranking belonged to Pogon Szczecin. Having overcome serious financial problems, the club managed to return to Ekstraklasa but remains one of the poorest among the best. In 2012, it found a major sponsor – Zaklady Chemiczne Police from the Azoty Group, which allowed it to regain financial balance. In 2012, the total value of the advertising equivalent (shirts and stadium barriers) reached PLN

3.45 million. Despite having the worst sports facility in Ekstraklasa, Pogon was among the league average – its stadium attendance being 38% per match. The major owner of the club is EPA company (almost 75%), but still it is the major sponsor who plays a pivotal role. Even though the club's revenue almost doubled year on year, its financial standing is not good, with the 2012 profitability ratio at –111.8%. Yet, its poor financial condition did not affect its sporting performance in 2013/2014 – Pogon managed to enter the champion group and had a chance to compete in the Europa League.

Ruch Chorzow is the only Polish football club which is listed on the stock exchange. In the 2012/2013 season it managed to avoid the drop to the first league only thanks to Polonia Warszawa being demoted. In 2012, the club's financial performance was better than its sporting results, but still was not good enough to guarantee further sporting achievements. Even though it saw an almost 25% rise in revenue year on year, the negative trend of its profitability ratio continued (–103.3%). What was comforting in Ruch's unfavourable position was its crowd, with an average attendance of almost 80%, which was partly due to the small capacity of the club's stadium. The sporting performance of the club in the 2013/2014 season was in direct contrast to its financial results – not only did it fight for the Ekstraklasa title, but having finished in 7th position, it was able to enter the Europa League qualifying round.

The last of the analysed clubs is Cracovia, one of the oldest teams in Poland. Its owners are: Comarch, a stock company (62.2%), and the Municipality of Krakow (37.5%). In the season of 2012/2013, the club played in League One and succeeded in reaching the top flight. Cracovia's presence in the lower league resulted primarily in a decreased club revenue, which was reflected in its profitability (–41%) as well as in a very low advertising equivalent in shirt sponsorship (PLN 337,000). The team's comeback to the top Polish league was their biggest success over the 2012/2013 and 2013/2014 seasons, finishing the season one point above the drop zone.

3. FINANCING FOOTBALL CLUBS

Sports clubs, especially football ones, are able to support themselves and the sources of their current revenue fall into three basic categories [Deloitte 2014]:

a) matchday revenue, derived from sporting event organisation (gate receipts, season tickets) ,

b) commercial revenue, including sponsorship and merchandising,

c) TV broadcasting.

The above sources of income can be augmented by revenue from transfers (purchase volume and the sales of football player's performance rights). Yet, long-term financing of a football club must be supported with sources that can

significantly stabilise its financial situation. Some of the many ways to generate a stable income that are practiced by clubs are shown in Figure 1.

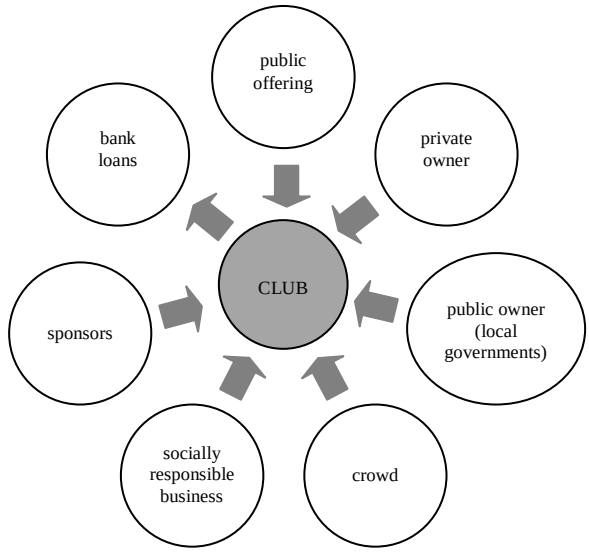

Figure 1. Sources of financing sports clubs

Source: own researches.

The above presented financing sources often result from the policies of the club's board or are imposed by the political situation or economic environment. These funds are the club's capital (either its own or external), which sometimes cannot be managed by the club itself.

If a club is a listed company, one of the ways to raise capital is a public issue of its stocks. Such money can be freely (and legally) spent by the company, the drawback being the obligation to publish a large amount of business information (depending on the range of restrictions imposed on the local market). The first clubs that went public were from the English leagues. In Poland, it was Ruch Chorzow that decided to pioneer stock exchange listing and is now listed on the NewConnect market.

In the majority of cases however, the clubs who are listed companies are the private property of corporations or individuals. Therefore, they are not able to raise capital from the public issue of stocks, which does not however rule out a private placement. The problem that such football clubs, being private companies, face is that they have to take into account the interests of many owners, each of whom demands control over the funds they have invested. In Poland, plenty of clubs have adopted this form of business operation.

Another example of financing clubs from private funds is limited liability companies and limited or registered partnerships. Such football clubs are fully dependent on their owner and, as the history of the Polish league has shown, can be traded freely. The most spectacular examples were the sale of Groclin Grodzisk Wielkopolski in 2008 by Zbigniew Drzymala, its then owner, to Jozef Wojciechowski, who was the President of the Polonia Warszawa football club at the time, or moving Piotrcovia Piotrkow Trybunalski (Piotrcovia-Ptak) to Szczecin accompanied by the change of the club's name to Pogon Szczecin.

One example of the successful financing of football is as a joint venture of local government and private equity. Clubs operating on such a basis can be partly controlled by their local communities. Since local councils usually cannot afford full sponsorship, they invite local businesses to provide capital. In this kind of partnership, clubs can count on long-term support, because such bonds are based on very strong local patriotism. In Poland, it is Jagiellonia Bialystok which thrives in such a scheme.

One of the less popular forms of financing a sports club is the revenue generated by fan membership fees. On the one hand, such a situation makes the club fully dependent on its spectators, on the other, it reinforces the emotional bond between the team and the local community, as in the case of Athletic Bilbao. The management in that club is quite specific, as it is based on the *cantera* principle – a distinct division into 'us' and 'outsiders', which means that the team players must be of Basque origin [Prabucki 2012: 195–208].

The last form of financing (shown in Figure 1) is sponsorship. It does not rule out the aforementioned schemes and is regarded as complementary to them. There are several types of sponsorship, such as general sponsorship (sometimes associated with the change of a club's name) or co-sponsorship, title or shirt sponsorship.

In the 1990s, general sponsorship was a very popular way of supporting clubs in all leagues, whereas today it can usually be found in lower leagues. It used to be associated with a change or an extension of a club's name (Termalica Bruk-Bet Nieciecza, Tygodnik Miliarder Pniewy, Drutex Bytovia). Unfortunately, this type of sponsorship weakens fan identification in the top flight, despite appearing successful in the lower leagues.

Co-sponsorship is popular in many countries when financing companies do not want to play the role of a key sponsor and prefer to emphasise their contribution to the development of a given sports discipline. As a result of this kind of cooperation between a club and a sponsor, the latter's corporate image is enhanced and the former's day to day operations are secured.

Title sponsoring is a contribution to organising a sports event rather than an individual club. For example, this is how Ekstraklasa has been sponsored by Orange (Orange Ekstraklasa) and T-Mobile (T-Mobile Ekstraklasa) or how Legia Warszawa's stadium was financed (Pepsi Arena).

Finally, the last of the sponsorship types mentioned above is shirt sponsorship, where a club is paid for the placing of a sponsor's logo on the players' outfits. This is one of the most effective ways of building brand value.

Irrespective of the type of sponsorship a club adopts, the sponsors benefit from the so called *blaze effect* [Mikołajczyk 2008: 245–258] – where a financing company gains from the transfer of a club's image, making its own well received. Such sponsorship is connected to the correlation of the club's sporting performance with the value of the sponsor's brand. It is, in effect, taking advantage of the fans' emotions – their positive approach to the sponsoring company translating from the club's success. What is more, if the sponsorship programme is managed properly, the club's lost matches do not affect the sponsor's brand value.

The sponsorship activities of companies that are financing football in Poland should be reflected in the fundamental measure of its success, i.e. the viewing figures. It is worth pointing out that Polish football audiences have been growing in recent years. Despite limited availability of TV broadcasts (most sports TV channels are paid), Ernst & Young [Ernst & Young 2012] recorded an increase in audience viewing in one round of matches to 1.6 million people, while the total audience in the 2012/2013 season amounted to 48,388 million viewers. Table 1 contains the data for the analysis of the above clubs' viewing performance.

Table 1. Viewing figures of chosen football clubs in Polish Ekstraklasa and League One in the 2012/2013 season

Club's name	Average audience (in thousands)	Average stadium attendance (in thousands)
Slask Wroclaw	317	14.9
Lechia Gdansk	251	13.2
KGHM Zaglebie Lubin	181	7.1
Pogon Szczecin	165	6.6
Ruch Chorzow	157	5.0
Cracovia Krakow	44	7.6
Total Ekstraklasa	**3310**	**133.0**

Source: Ernst & Young [2013]

The data in Table 1 were a point of reference for the results of the present analysis, which was conducted by means of econometric methods. The information about the clubs' viewing figures is a reflection of schemes designed by sponsors, i.e. of the efficiency of their policies. The only exception to this rule is Cracovia whose viewing figures do not seem to be an accurate reference point.

4. RESEARCH METHODS

The author of this paper assumes that the clubs' sporting results (or betting forecasts) have an effect on the price of their sponsors' stocks. This effect is a result of the released emotions of those football investors who are also football fans. Additionally, it can be proved that the character of this relationship can vary depending on the nature of the financial agreement between the club and its sponsor. When verifying his hypothesis, the author used autoregressive models ARCH and GARCH, selected on the basis of thorough literature studies.

In previous works on football economics the authors used the quantitative methods listed in Table 2.

The proposed approach uses autoregressive process modelling (ARCH and GARCH) in order to determine the relevance of the effect of sporting performance and betting odds on return rates of sponsoring companies' and football club owners' quotations in Ekstraklasa.

The analysed variables are: league match results variable and match date variable as dummy variables, as well as the variables of betting odds for these matches.

It has been assumed that the regression function on the basis of which the regression models will be built is:

$$y_t = \gamma_0 + \sum_{k=1}^{n} \gamma_k X_{kt} + \varepsilon_t$$

The ARCH(q) model is written [Engle 1982]

$$h_t = \propto_0 + \sum_{i=1}^{q} \propto_i \varepsilon_{t-i}^2$$

where:

$$\propto_0 > 0, 0 \leq \propto_i \leq 1, \varepsilon_t \sim N(0, h_t)$$

The general form of the GARCH model is [Bollerslev 1986: 307–327]:

$$h_t = \propto_0 + \sum_{i=1}^{q} \propto_i \varepsilon_{t-i}^2 + \sum_{j=1}^{p} \beta_j h_{t-j}$$

Table 2. Review of studies on the relationship between the prices of listed companies and sporting results

Author	Subject of analysis	Variables used in the model	Method
Stadtmann [2003]	BVB	Stock index, game results, players' contracts, transfers, players sold, coach's contracts	Regression
Ashton, Gerrard, Hudson [2003]	All British clubs	FTSE index, game results	GMM
Douque, Ferreira [2005]	Porto, Sporting Lisbon	Index PS20, game results, daily turnover volume, risk-free rate	ARCH-GARCH
Berument, Ceylan, Gözpınar [2006]	Beşiktaş, Fenerbahçe, Galatasaray	Index ISE100, international game results	GARCH
Edmans, Garcia, Norli [2007]	50 national teams	International game results	GARCH
Klein, Zwergel, Heiden [2009]	European national teams	International game results	Regression
Baur, McKeating [2009]	Components of DJ Stoxx FI	Game results	Panel regression
Samagio, Couto, Caiado [2009]	20 British clubs	Salaries, transaction volume, cost of players, game results	Structural model
Bell, Brooks, Matthews, Sutcliffe [2010]	19 British clubs	Stock index, game results, goal difference, match venue, betting odds	Regression
Benkraiem, Le Roy, Louhichi [2010]	11 British clubs	Game results, match date and referee	EGARCH
Aglietta, Andreff, Drut [2010]	Components of DJ Stoxx FI	Clubs' market share, advertising revenues, media audience	Regression
Demir, Daniş [2011]	Beşiktaş, Fenerbahçe, Galatasaray	Index ISE100, expected and unexpected game results	Regression
Berument, Ceylan [2012]	Chile, Turkey, England, Spain	National indices, game results	EGRACH
Bell, Brooks, Markham [2012]	All British clubs	FTSE index, game results	Verification of statistical tests
Leitão, Armada, Ferreira [2012]	Components of DJ Stoxx FI	DJ Stoxx FI	Granger's co-integration and causality tests
Saraç, Zeren [2013]	Beşiktaş, Fenerbahçe, Galatasaray	Index ISE100, game results, betting odds, goal difference, type of game, game venue, derby	Regression

Source: own study based on Saraç, Zeren [2013: 299–314].

The generalised form of the EGARCH model is [Xiuhongshi and Kobayashi 2009: 2797–2808, see also: Nelson 1991: 347–370]:

$$y_t = \sqrt{h_t e_t}$$

$$\log(h_t) = \propto_0 + \beta \log(h_{t-1}) + \gamma \left|\frac{y_{t-1}}{h_{t-1}}\right| + \left|\frac{\theta y_{t-1}}{h_{t-1}}\right|$$

where: $-1<\beta<1$

The above models' parameters are estimated by means of the maximum likelihood method. In this study the author uses the GRETL programme.

5. EMPIRICAL STUDY

The results of the analysis are shown in Table 3, in a form that allows the research hypothesis to be verified. According to the terminology adopted at the beginning, the companies have been classified according to their relationship with the analysed sports clubs.

Table 3. Estimation of the model parameters in a descriptive form

Club	Company	Model	Statistically relevant variables	Parameter sign	p-value
Ruch Chorzow	Ruch Chorzow SA	GARCH(1,1)	likelihood of a draw	„+”	0.06642
KGHM Zaglebie Lubin	KGHM SA	ARCH(1)	victory;	„–”	0.05581
			likelihood of a victory;	„+”	0.02174
			likelihood of a draw;	„+”	0.00848
Cracovia Krakow	Comarch SA	GARCH(1,1)	victory;	„+”	0.00976
			likelihood of a victory;	„–”	0.01314
Lechia Gdansk	Lotos SA	EGARCH (1,1)	match day	„+”	$3.77e^{-07}$
Slask Wroclaw	Tauron SA	GARCH(1,1)	loss;	„+”	0.00196
			likelihood of a loss;	„–“	0.00946
Pogon Szczecin	ZCh Police Grupa Azoty	GARCH(1,1)	victory;	„+”	0.02934
			likelihood of a victory;	„–”	0.05692

Source: own calculations.

The names of companies listed on the WSE, for which rates of return are dependent variables of specified ARCH-type models, are presented in the second column in Table 3. The fourth column contains only those variables which have the biggest impact on the rates of return.

There were initially two types of variables: likelihood of the sporting result (from bookmaker's market) and dummy (zero–one) variables as signals of the correct result. The example of statistical data is presented in Table 4 in the appendix.

The above table contains information about econometric models that the author managed to estimate for the analysed data. In the majority of cases, the analytical form that was adopted was in the form of the GARCH(1,1) model, except for the return rate on the stocks of:

– KGHM, explained by means of the likelihood of victories and draws and by a dummy variable denoting a victory, where the best results were obtained for the ARCH(1) model;

– Lotos, with the explanatory variable being a dummy variable signalling a given match, where the best approximation was provided by the EGARCH(1,1) model.

Three of the analysed cases are very similar: KHGM Zaglebie Lubin, Cracovia Krakow and Pogon Szczecin, where the explanatory variables of the return rate are:

– a victory,

– the likelihood of a victory.

Additionally, there is a likelihood of a victory in the case of Zaglebie.

What is important in the case of Pogon and Cracovia is that the signs of variables are also identical (negative likelihood and positive victory). As for Zaglebie, the signs are reversed. Please note that Slask Wroclaw – Tauron's return rates also have two explanatory variables: a loss and the likelihood of a loss, whose signs are also opposite.

What should also be emphasised is the fact that both Zaklady Chemiczne Police and Comarch have decided to cooperate with the clubs on a long term basis, while Tauron has announced that its sponsorship contract will be terminated. Both companies have focused their sponsorship policy on building strong and recognisable brands.

In the case of Ruch Chorzow, the relationship with the club seems to be rather adventitious, while Lechia Gdansk counted on cheaper advertising (both shirt and TV), which is not an exception – during the fundamental round Pogon Szczecin also expected similar benefits.

Therefore, a conclusion can be drawn that the above discussed relationships are temporary and changing constantly, which can put off stock market investors.

6. CONCLUSIONS

In this study, the author used autoregressive models to discover if there is any relationship between the return rates of the stocks of companies that sponsor football clubs in Polish Ekstraklasa and the clubs' sporting performance or the related betting odds. The study showed that such a relationship does exist, but is not of a permanent nature. The most closely linked are return rates and betting odds, which confirms the theses that can be found in the reference literature that football evokes strong emotions among those fans who are likely to invest on the stock markets.

The question in the title of this paper requires a clear answer to the following question: is football one of the alternative ways of doing profitable business or is it a result of its managers' altruism? From the economic standpoint, it is the clubs that gain most – since their current and future operations are being financed. From the social point of view, the clubs' fans are beneficiaries as well – what they get is entertainment in the form of sporting events that evoke powerful emotions. The most difficult part is discovering what the sponsoring companies gain. The answer to this question is complex, because it depends on which category of financing we are concerned with.

When juxtaposing the obtained results with the image of the average Polish football league fan, we obtain further clues on the character of the relationships discussed in this article. He or she is a 25–34-years old high school graduate who uses the internet to follow all the information about the football market [Ernst & Young 2013], thus, being very likely to come across betting odds concerning the results of football games. Assumedly, a section of these fans are able to use this information to invest on the stock exchange.

This part of the paper started with a reference to the latter part of the question in the title, i.e. thanks to their clubs' sponsors, football fans get the opportunity to feel the emotions they desire. And this thesis has been hereby proven. The question remains though of whether companies that finance sports clubs are organisations of an altruistic nature and if football truly brings enough profit to support them. As the examples of Azoty or Lotos show, any company that has decided to sponsor a sports organisation must choose between building its brand image through expensive advertising or through displaying its logo during sport events, thus manifesting its social consciousness. On the other hand, such monopolies as KGHM or Tauron may have different priorities. In the case of the former company, it is the employer's concern for their workers' leisure time. The latter has become disillusioned with the club's poor performance and, finally, decided to terminate the sponsorship agreement.

There is also the unique example of Cracovia, whose relationship with the sponsor is based on the personal qualities of their charismatic president. In this case his personal needs are of central importance.

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BIZNES WYKORZYSTUJĄCY EMOCJE CZY ALTRUIZM? PRZYPADEK FINANSOWANIA PIŁKI NOŻNEJ W POLSCE

W książce „Soccernomics" S. Szymanski i S. Kuper piszą o obalaniu popularnych mitów związanych z piłką nożną. Jednym z większych mitów, jak piszą autorzy, jest stwierdzenie, że piłka nożna to wielki biznes. Jeżeli piłka nożna nie jest wielkim biznesem, to należy się zastanowić dlaczego skupia wokół siebie tak wielkie pieniądze – jak podaje raport Deloitte'a w 2014 r., przychody tylko 20 największych klubów na świecie najprawdopodobniej przekroczą 6 miliardów euro. Stąd pytanie, które postawiono w tym artykule – czy piłka nożna to biznes, który wykorzystuje emocje czy może kaprys altruistycznych biznesmenów?

Celem artykułu jest weryfikacja hipotezy o behawioralnym charakterze związków między przedsiębiorstwami finansującymi kluby piłkarskie a klubami i sympatykami tych klubów. Analizie zostaną poddane spółki giełdowe, które są zaangażowane w finansowanie funkcjonowania klubów najwyższej ligi rozgrywkowej w Polsce – Ekstraklasy. W analizie były wykorzystywane kursy akcji następujących spółek giełdowych: Comarch, KGHM, Zakłady Chemiczne Police Grupa Azoty, Tauron, Energa i Lotos. Wśród tych spółek można wyróżnić dwie grupy: właścicieli klubów piłkarskich (Cracovia, Zagłębie Lubin) oraz sponsorów piłki nożnej (Pogoń Szczecin, Lechia Gdańsk, Śląsk Wrocław). Do badania zostaną użyte kursy akcji, wyniki sportowe klubów oraz prawdopodobieństwa bukmacherskie

Słowa kluczowe: piłka nożna, kursy bukmacherskie, emocje, modele typu ARCH.

Appendix

Table 4. An example of data used for the econometric modelling of Police's rates of return

Date	Rt	W	D	L	pW	pD	pL	MD
2012.08.20	0.0067	1	0	0	0.3333	0	0	1
2012.08.21	–0.0409	0	0	0	0	0	0	0
2012.08.22	–0.0408	0	0	0	0	0	0	0
2012.08.23	0.0135	0	0	0	0	0	0	0
2012.08.24	–0.0036	0	0	0	0	0	0	0
2012.08.27	0.0071	0	0	0	0	0	0	0
2012.08.28	0.0089	0	0	1	0	0	0.2941	1
2012.08.29	–0.0296	0	0	0	0	0	0	0
2012.08.30	–0.0184	0	0	0	0	0	0	0
2012.08.31	0.0000	0	0	0	0	0	0	0
2012.09.03	0.0074	1	0	0	0.4444	0	0	1
2012.09.04	–0.0018	0	0	0	0	0	0	0
2012.09.05	0.0192	0	0	0	0	0	0	0
2012.09.06	0.0108	0	0	0	0	0	0	0
2012.09.07	–0.0144	0	0	0	0	0	0	0
2012.09.10	0.0153	0	0	0	0	0	0	0
2012.09.11	0.0072	0	0	0	0	0	0	0
2012.09.12	–0.0098	0	0	0	0	0	0	0
2012.09.13	–0.0135	0	0	0	0	0	0	0
2012.09.14	0.0215	0	0	0	0	0	0	0
2012.09.17	0.0628	1	0	0	0.3344	0	0	1
2012.09.18	0.0296	0	0	0	0	0	0	0
2012.09.19	–0.0008	0	0	0	0	0	0	0
2012.09.20	–0.0346	0	0	0	0	0	0	0
2012.09.21	–0.0110	0	0	0	0	0	0	0
2012.09.24	0.0126	0	1	0	0	0.2874	0	1
2012.09.25	0.0133	0	0	0	0	0	0	0
2012.09.26	–0.0041	0	0	0	0	0	0	0
2012.09.27	–0.0125	0	0	0	0	0	0	0
2012.09.28	0.0067	0	0	0	0	0	0	0
2012.10.01	0.0017	0	1	0	0	0.3125	0	1

Source: bossa.pl and www.betexplorer.com.