Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economics (FEM)

Master's Thesis

Determinants of Football Player Transfer Value

Lina Trushnikova

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

DIPLOMA THESIS ASSIGNMENT

Bachelor of Science Lina Trushnikova

Economics and Management
European Agrarian Diplomacy

Thesis title

Determinants of Football Player Transfer Value

Objectives of thesis

The aim of the diploma thesis is to determine and to evaluate the main factors influencing the transfer value of footbal player.

The aim will be fulfilled based on the partial aims. Then, several hypotheses will be defined and verified. Based on the results of and empirical analysis the final conclusions will be introduced.

Methodology

The diploma thesis will cover both, theoretical and empirical part. Theoretical part will contain theoretical background of the selected topic as well as the methodological framework. Scientific literature will be used to prepare the literature overview. The empirical analysis will be based on econometric approach. Based on the empirical analysis the results will be presented and some recommendations will be suggested.

The proposed extent of the thesis

60 – 80 pages

Keywords

Football player, determinants, OLSM, econometric model.

Recommended information sources

GUJARATI, D N. *Econometrics by example.* London: Palgrave Macmillan Education, 2015. ISBN
978-1-137-37501-8.

KOČENDA, E. – ČERNÝ, A. – UNIVERZITA KARLOVA. *Elements of time series econometrics: an applied
approach.* Prague: Karolinum, 2014. ISBN 978-80-246-2315-3.

PESARAN, M H. *Time series and panel data econometrics.* Oxford: Oxford University Press, 2015. ISBN
978-0-19-875998-0.

RUJIG J., van OPHEM H. (2015). Determinants of football transfers. DOI: 10.1080/13504851.2014.892192.

SEDDIGHI, H R. – LAWLER, K A. – KATOS, A V. *Econometrics : a practical approach.* London: Routledge,
2000. ISBN 0-415-15645-9.

Expected date of thesis defence

2021/22 SS – FEM

The Diploma Thesis Supervisor

Ing. Lenka Rumánková, Ph.D.

Supervising department

Department of Economics

Electronic approval: 23. 3. 2022

prof. Ing. Miroslav Svatoš, CSc.

Head of department

Electronic approval: 23. 3. 2022

doc. Ing. Tomáš Šubrt, Ph.D.

Dean

Prague on 31. 03. 2022

Declaration

I declare that I have worked on my master's thesis titled " Determinants of Football Player Transfer Value" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 31/03/2022   Lina Trushnikova

Acknowledgement

I would like to thank thesis supervisor Lenka Rumankova for sufficient help, my working practice supervisor Irina Startseva for given opportunities.

Determinants of Football Player Transfer Value

Abstract

The popularity of football is only increasing during last 3 decades, which also boosts the financial activity of professional football associations. The money flow in professional teams is raising, and transfer market and transfers itself play the key role not only in club's revenue, but also in expenses. The transfer market has been actively developing in the recent decades that has a significant stimulating effect on the footballers` transfer prices growth rate. Transfer value of player mostly is not equal to market value of player what raises the main question of the research: what influence on the transfer value of players in European premier leagues? The main aim of the research is to find the main regressors of transfer value and determine the direction of influence. The assumption that not every player decides to move to another team during transfer window, therefore, the sample of players who has made a transfer does not represent the general sample, is considered. The methodology includes the comparison of Ordinary Least Squares method and Two-Step Heckman model for proving the shift between estimates. In the future, it will be possible to expand the study by increasing the set of variables, using proxy variables for non-numeric parameters, which cannot be included currently in the research, or expanding the scope of observations to obtain a more accurate illustration of the transfer market.

Determinanty transferové hodnoty fotbalových hráčů

Abstrakt

Obliba fotbalu se v posledních 3 desetiletích teprve zvyšuje, což podporuje i finanční aktivitu profesionálních fotbalových asociací. Tok peněz v profesionálních týmech se zvyšuje a přestupový trh a samotné přestupy hrají klíčovou roli nejen v příjmech klubu, ale i ve výdajích. Přestupový trh se v posledních desetiletích aktivně rozvíjí, což má významný stimulační vliv na tempo růstu přestupových cen fotbalistů. Přestupová hodnota hráče se většinou nerovná tržní hodnotě hráče, což vyvolává hlavní otázku výzkumu: jaký vliv na přestupovou hodnotu hráčů v evropských ligách? Hlavním cílem výzkumu je najít hlavní regresory převodní hodnoty a určit směr vlivu. Předpokládá se, že ne každý hráč se rozhodne během přestupového období přejít do jiného týmu, a proto vzorek hráčů, kteří přestup provedli, nepředstavuje obecný vzorek. Metodika zahrnuje srovnání metody obyčejných nejmenších čtverců a dvoukrokového Heckmanova modelu pro prokázání posunu mezi odhady. V budoucnu bude možné rozšířit studii o rozšíření množiny proměnných, využití proxy proměnných pro nenumerické parametry, které nelze v současné době zahrnout do výzkumu, nebo rozšířením rozsahu pozorování pro získání přesnějšího znázornění transferový trh.

Klíčová slova:

Fotbal, ekonomika sportu, převodní hodnota, přestupový trh, Heckmanova procedura, OLS, zkreslení výběru vzorků, zkreslené odhady

Table of content

1. Introduction

Based on the open sources, during last decade the stable growth of football transfer market is observed. According to Deloitte (Deloitte, 2020), total revenues of football teams have increased by 16% since last year, what is the most significant income boost during last 10 years. Average annual growth rate of football teams' income is almost 10% and remains stable since 1996. These facts indicate the continued popularity and financial well-being of football as a separate industry, and a high interest in it.

One of the key sources of income for a professional football club is the income from football players' transfers, therefore, an increase of the transfer value of each member of a sports football team allows the club to successfully conduct its financial activities (Deloitte, 2020).

Based on Deloitte report (Deloitte, 2018), player transfers are a key part not only of club revenues but also of expenses. It should be noted that since professional clubs are constantly selling and leasing players to other teams, therefore, the budget of each team includes funds for the purchase of players from other clubs. Sports observers and news portals observe a steady increase in wages among professional football players, and in each transfer window, a continuous increase in transfer prices when making transactions for the transfer of athletes is recorded. During transfer windows enormous money is offered and paid for the football players by different teams around the transfer market. Financial aspect of football raises a lot of questions from experts, economists, researchers, and team managers. Unbelievably high money which teams get from selling their players cannot stay without attention, so the question what influences on the transfer value of football player is still open and has no clear explanation.

Obviously, the football player transfer value is determined by many different factors. A lot of people, journals, data analysts and team managers follow up on the statistics of success and fails of football teams. However, the methods used for prognosing the market and transfer values are not available for everybody, so there is no clear answer on the problem of transfer value prognosis.

2. Objectives and Methodology

2.1. Objectives

Aim of the research – to build the econometric model that determines the level of various factors influence on the transfer value of a football players.

For achieving stated aim, the following tasks are formulated:

1. Make a theoretical and methodological analysis of existing research in this area to identify the most relevant data analysis methods
2. Set up hypotheses about the factors affecting the transfer value of players
3. Collect data on professional football players and their personal, team and market characteristics for further analysis
4. Select the most relevant econometric models to apply on real data and identify their limitations
5. Build a model
6. Analyze and interpret the results

Object of the research – transfer value (sum of money) which one football team pays for player transfer.

Subject of the research – the determinants of transfer value: the factors and variables which increase or decrease the potential or real transfer value of players in European premier leagues.

Based on the study of existing literature, the following research question is formulated: "What are the factors that explain the transfer value of football players?".

2.2. Methodology

To achieve the goal set in this study, it is necessary to choose a relevant model. Theoretical and methodological analysis and a review of similar studies on the topic make it

possible to determine the most appropriate model, taking into account the features of the data and the specifics of the variables.

Most of the studies mentioned in the literature review have used on of two different methods to assess the transfer value of football players:

1. LRM (Linear Regression model): the linear regression model where the dependent variable "transfer value" is estimated under the set of variables describing the player, his team, opponents, tournaments, stadium, etc

2. Two Step Heckman Model (Heckman, 1979): building two connected equations, where the first one – probit model with the binary dependent variable (decision about the transfer: to make transfer or to stay in the current team); second equation – linear regression with the dependent variable "transfer value" but including the Heckman's lambda into the equation

To determine the optimal methodology, it is needed to investigate in more detail the process of forming a certain transfer value of a professional football player:

First, it should be noted that the process of "migrating" a player from one team to another has many stages, and occurs in a certain way, and not randomly. In the first stage, the team that owns the player, or the player's agent, receives an offer from another club to sell or loan the player for a certain amount. On the other hand, in addition to the desire to acquire a player, the consent of the owner club to give or sell the player, as well as the consent of the athlete himself to the transaction, is necessary.

Often the process of selling a player is not limited to an offer from one club. During the process of making a decision, the owner team may receive offers from other teams to sell, therefore, a large number of factors that characterize the teams participating in the auction will influence the decision. The process of selling a player rarely takes place in one step: in most cases, several teams are bidding for one player, and bids can rise during the bidding process, especially if opposing teams are interested in the player, for example, long-term competitors in

13

the Spanish League FC Real Madrid and FC "Barcelona", i.e. rivalry in the auction can positively influence the size of the transfer fee.

Also, a player may accept or may not accept a decision to move to another club for several reasons. The decisions to "transfer" and "stay in the team" are influenced by many variables that need to be taken into account:

- The remaining time before the contract expiration
- Relationships of the player with team members and managing / coaching staff
- The offer itself
- The necessity of moving to another city / country / continent
- Marital and family status of the player

It is worth noting that the player's transfer value in most cases is not equal to the market price: the transfer price can either exceed the player's market price or be less than it. The excess of the transfer value over the market value is explained by the player's sports success, the development of sports skills, the interest of the player from the "top" teams and other factors. But there are cases when a player did not change the team, even if the price offered for him was significantly higher than the market price. This action on the part of the owning club can be explained by the special value of the player for the team or the extreme loyalty of the player to his club.

On the other hand, some "migrations" of players are completely free: that means that the player's transfer value is 0. Such situations arise due to the end of the player's current contract with one club, and he moves to another team without any compensation or payment. This phenomenon is quite common, as not all players receive offers to move to another team (not all players are in demand), therefore, the end of their current contract lowers the potential transfer value to 0.

During transfer windows players can move between clubs, the cost of transfers starts from zero. Not all players decide to change clubs, not all players' transfers are paid, therefore estimating the transfer price of only those players who changed teams in the "transfer window"

and changed teams at a non-zero price could lead to odds that are inconsistent and biased due to self-selection of the sample.

The problem of biased and inconsistent estimates was first explored in a study of individuals' employment decisions based on their payment preferences: in the analysis on the factors influencing wages of individuals, James Heckman demonstrated that including into sample only those individuals, who made the decision to "work", and the absence of those individuals who do not work, but would decide to "work", for example, under different wage conditions, lead to the appearance of biased and inconsistent OLS estimates due to omitted variables (Heckman, 1977).

This phenomenon has become known as selectivity bias, which can be avoided by correcting the model. Since absolutely all players of all teams are considered in the transfer market, each athlete has the opportunity to move to another club. Staying in the same club or vice versa the transition to another club for some players can be explained by a number of different factors, as already mentioned above, i.e. the fact of a transfer from the club or contract prolongation is not accidental, which means that it is necessary to take the decisions to move or to stay into account when building a model to study the factors influencing the transfer cost (Heckman, 1977).

To obtain unbiased estimates, it is necessary to examine the data not only on those players who made the transfer, but also take into account those players who made the decision "to stay in the current team" during the transfer window. For players who did not transfer, their transfer value is not observed, therefore, studying only the proportion of players who signed a new contract distorts the true results.

The problem of "bias due to selective selectivity" can be overcome using Heckman's two-step procedure, the essence of which is to include the transfer (participation) equation in the model of determinants of the transfer value of football players. Consistent and unbiased estimates in this model are achieved by including the self-selection effect in the regression (Aguirregabiria, 2009). In addition to the computational simplicity of the two-step Heckman procedure, it is robust to heteroscedasticity and non-normality, which gives it an additional

advantage when choosing between Heckman procedure and maximum likelihood estimation. Researchers who have used the Heckman model in their analysis note that this method is the most relevant for assessing player data and determining variables that have an impact on player transfer value (Carmichael et al., 1999).

It should be noted that in the equation of participation at the first step there must be a variable that affects the fact of the transfer but does not have an impact on the transfer price of the player. The following factors can be used as an indicator variable:

- Change of main team coach: probably, the change of main coach would influence positively on the decision to change the team during transfer window because of bad relationships between player and the new coach. Moreover, if the coach, with whom the player has a good relationship, moves to another team, he can "push" the player to follow him during transfer window. Also, there is a chance of the situation where the new team coach can make a decision about drastic changes in the starting lineups for the match, and the player decides to change the team in order not to sit on the bench instead of playing often. The change of the head coach of the team definitely influences the decision of the player to leave the team or stay in it; but it does not affect the value of the transfer fee of the player, therefore, can be used as an indicator variable.

- Marital status: the player may refuse to change teams because having a family (especially children) may cause the player to want to stay in the current city or country, and not want to move and leave the family far away. On the other hand, a player who works away from his family may actively desire to transfer to teams playing close to his hometown where his family is located. The presence of a family can be used as an indicator variable, since this factor influences the decision to change teams, but does not affect the transfer price.

After determining the indicator variable (in this case, two variables), the first step is to estimate the probability of a player changing a team using a probit model with a binary

dependent variable characterizing the fact of changing a club during the transfer window we are studying (1):

$$D_i = a_0 + x_{1i}a_i + \varepsilon_{1i},$$

Where D_i – dummy binary variable of the player's transfer to another club (1 - transfer, 0 - no transfer)

x_{1i} – player characteristics vector

Second step – estimation of the determinants of the transfer value of players by the Ordinary Least Squares method, taking into account the Heckman lambda (inverse Mills ratio) obtained in the first step, to correct the bias problem (2):

$$TV_i = \beta_0 + \beta_i x_{2i} + \sigma_{1i}\lambda_{1i} + \varepsilon_{2i}$$

Where TV_i – transfer value of the player "i" obtained during the transfer window

x_{2i} – player characteristics vector

λ_{1i} – Heckman's lambda

σ_{1i} – covariance of the random term in the first step equation

The significance of σ_{1i} (coefficient of Heckman's lambda) determines the presence of a sampling problem. The difference between the estimates of the coefficients in the classical linear regression model, estimated by the Ordinary Least Squares method, and the estimates obtained in the Heckman model will confirm the hypothesis about the bias of the OLS estimates in the classical linear regression and the hypothesis about the expediency of using the two-step Heckman procedure (Heckman, 1977).

The results obtained on the basis of estimation using the two-step Heckman procedure must be compared with the Ordinary Least Squares method estimates. The shift of the coefficients in the Heckman model up or down will be a sign of the need to use the Heckman model, the addition of the Heckman lambda and the "participation" equation will lead to the appearance of reliable estimates - unbiased and consistent compared to the OLS estimates.

3. Review

2.3. History and theory of football

The exact date of the emergence of football is not exactly known, but it can be said certainly that the history of football has more than one century behind its back and has affected many countries. Each country with an ancient history ascribes to itself the primacy of the creation of this game. As well as painting, theater, playing football at the dawn of mankind had an applied, ritual character. Competitions in honor of the gods, sacrificial games, where the winners received not only the approval of the crowd, but also the right to keep their lives – that`s how the rules of the game looked back in the days. Archaeologists have found images of people playing with an object that looks like a ball on the oldest rock paintings. Ball games were popular on all continents, as evidenced by the ubiquitous finds of archaeologists. In ancient China, there was a game known as "Cuju", which was first mentioned in the second century BC. It can be considered as the most ancient of the predecessors of modern football (sport-wiki.org)

To some extent, the Italian game of the XIV century named "Calcio" can be considered the prototype of modern football. It was in Calcio that the team members were divided into defenders, attackers and referees. It is believed that the Italians brought this game to Britain. The Church had a negative attitude towards such competitions. The game was brutal, sometimes bloody. The market squares served as the field, the shops and tables of merchants served as the gates. Local authorities had to issue special laws prohibiting the game, which was dangerous for the townspeople. By the middle of the 19th century, the ball game began to acquire civilized features. The birthplace of modern football is England, since the term itself and the first rules were adopted there (sport-wiki.org)

The first football team, "Sheffield", originated in the city of Dronfield in 1857 from among the members of the cricket club. In 1860 the first football match took place between Sheffield and Hallam players. In 1863, the Football Association was created in Great Britain. The rules of the game were adopted, which prescribed the amateur, not professional, nature of the new sport. The participants and even the goalkeeper should play exclusively with their feet.

The professional status of the sport required referees. And, at first, they gave signals with a bell or voice, then from 1878 referees started to use whistles. In 1890, football goals were limited to nets.

The generally recognized leader of world football in recent years is Brazil. England and Italy (European champion in 1968, second prize-winner of the World Championship in 1970) have made a significant step forward after many years of failures in recent years. Among the leading football powers were also Hungary (three-time Olympic champion of the post-war period), the USSR, Yugoslavia, Germany, Czechoslovakia, Sweden, Argentina, Uruguay and others (stadion-kuban.ru)

Although the Olympic tournaments are now inferior in their sporting significance to the world championships, they have retained and even increased their attractive power. Teams from 78 countries participated in the 1968 Olympic football competitions, and 84 countries applied for participation in the 1972 Olympics. Olympic competitions provide an opportunity to gain experience and improve the rating of football players from those countries that until recently did not have the conditions for the development of football and entered the international arena late. This applies primarily to the countries of Asia and Africa. For countries with highly developed football, Olympic tournaments are increasingly turning into a review of reserves (championat.com)

In addition to world-class tournaments, continental championships have gained a lot of weight. The oldest of them is the South American Championship, which has been played since 1916. True, in recent years, interest in it on the continent has somewhat fallen. On the contrary, in Europe, where the championship has been played since 1960, the popularity of the tournament is growing constantly. Similar competitions are also held in Africa and Asia (transfermarkt.de)

International competitions of teams have been implemented since 1927, when the countries of Central Europe started playing for the Mitropa Cup. In 1955, international club tournaments for the first time took on a continental character: the start of the European Champions Cup was laid, which has now become the most popular tournament. Later, the European Cup Winners' Cup, the Fairs Cup, the South American Champions Cup, the African

Champions Cup and other similar tournaments have begun to be played. Since 1960, the winner of the European Cup and the winner of the South American Champions Cup have contested the Intercontinental Cup. A prominent place in the international calendar is now occupied by international tournaments of youth teams (Kapuscinski, 2013).

The national calendars, which form the basis of the football life of any country, in the overwhelming majority of cases include two main tournaments with the participation of teams - the national championship (according to the circular system - usually in two rounds) and the Cup of the country (according to the Olympic system - with elimination after defeat) . These principles formed the basis of football life in the Soviet Union as well (Giulianotti, 2009).

Football was brought to Russia by the British at the end of the 19th century. In 1897, the first football team ("Sport") was organized in St. Petersburg. But until 1917, Russian football was not showing great achievements. In 50 international matches, only 7 victories were gained against 36 defeats, and the Russian team did not win any of the 8 matches. At the 1912 Olympics, Russia suffered a disastrous defeat from the German team - 0:16 (Kapuscinski, 2013).

Only during the years of Soviet Union football become a truly popular mass sport. Currently, there are about 5 million football players in the country. Tens of thousands of stadiums, complex sports grounds, football fields are at their disposal (Giulianotti, 2009).

The championship of the USSR was first played by the national teams of the cities. Moscow football players achieved the greatest success in these competitions. Since 1936, the championship and the USSR Cup for teams have been held. The greatest success in these tournaments was achieved by the Moscow teams: Dinamo, Spartak, CSKA, Torpedo, Kiev and Tbilisi Dinamo.

Soviet football entered the broad international arena in the post-war period. In 1945, Dynamo Moscow made a triumphant visit to England (2 wins, 2 draws), and in 1947 to Sweden (2 wins), which at that time set the tone in continental Europe (Olympic champion in 1948). In 1946, the Soviet Union joined FIFA.

The USSR team played its first official match in 1952 against the national team of Bulgaria (2:1). At the 1956 Olympic Games, the USSR team won gold medals, beating Yugoslav footballers in the final (1:0). Another major success was achieved in the first European Cup (1960), when the USSR team defeated the same team from Yugoslavia in the final (2:1) and became the winner of the tournament. In the 1964 European Cup, Soviet football players took the second place after the Spain team. The Soviet Union is the only country that was in the top four in all three draws of the European Championship (1968 – 4th place).

The Soviet school of football has long been famous for the collectivism of action, the maneuverability of players, their speed and athleticism. However, in terms of technical equipment, Russian players still lag behind European and especially South American prime ministers. In this area, the superiority of the Brazilians, who masterfully control the ball, is undeniable.

Reliable technique of the Brazilians and the British put at the service of modern tactical systems of the game. At the same time, Brazilian football has a pronounced attacking focus. English football is more restrained, it pays significant attention to defense. Italian football has a clear defensive power, it is characterized by the concentration of large forces in defense, rare counterattacks and low performance. Such football is practiced in many countries of Europe and South America. As the popularity of the game of football grew, the need arose for a single regulatory international body. It was FIFA, or International Football Federation, which was founded in 1904 (Baroncelli, 2006).

In 1900, football was included in the program of the Summer Olympic Games for the first time in history. Only teams from France, England and Belgium participated in the competition. However, FIFA still does not include the 1900 and 1904 Olympic tournaments in its statistics and considers them indicative. The London Olympics of 1908 was recognized as the first international official tournament under the auspices of FIFA.

The first World Cup took place in 1930. Uruguay was victorious, which team at that time was considered as the strongest.

The real burst of the football popularity happened in 1950-ies and 1960-ies, with the appearance of the first real football legends: Pele, Yashin, Di Stefano, Puskas and many others. These icons attracted crowds of fans to the football stadiums, TVs and radios worldwide. After that, football global acclaim only continued to grow, making it game number one for the whole world.

2.4. The review of the modern professional football

Before starting proper analysis of transfer market in football, it is needed to be mentioned that only since 1995 professional football players have received the opportunity to change the football team immediately after the expiration of the current contract without paying fee to their previous team. Before 1995 football out-of-contract players were able to join the new team only after paying money compensation to the team they were playing in before. The new rule – Bosman ruling – has appeared when relatively unknown Jean-Marc Bosman (Belgian defender) decided to change the world of football (Simmons, 1997).

In 1990 the expiration of the Bosman's contract was about to happen, and according to the current rules, he was able to join another team who offered Bosman better contract only if the new team agreed to pay compensation to his previous team unless the "owner" allows to switch the team for free (Simmons, 1997).

Obviously, his team Liege demanded a fee, and it caused one of the most significant changes in modern football. Bosman has started fight and has brought the case to the European Court of Justice against the Belgian FA, RFC Liege and UEFA, citing the 1957 Treaty of Rome, which guaranteed the freedom of movement for players anywhere in Europe (skysports.com).

Court agreed that the limitations of player movements and the demand for money compensations are not under the law and conducted to review current transfer system in Europe and make changes. Bosman has won, and now the players are not only allowed to leave a club on a free transfer basis, but also have an opportunity to make a new team to offer higher salaries for the opportunity to get the player on free transfer basis. Moreover, the players whose contracts are almost close to expiration date can push their current teams to increase salaries using the

fear of losing the valuable player with even no money compensation. After the Bosman ruling acceptance, transfer market has started to grow up and change, becoming more similar to other labour market in general (Muehlheusser, Feess, 2003). The player with expired contract has no more limitations and becomes a free agent on the transfer market with the opportunity to sign new contracts with no obligatory money compensation to the previous "employee" (Feess, Muehlheusser, 2003).

The literature review included in this research contains the most important papers written after the Bosman case, as the modern transfer market cannot be compared to the transfer market before 1995 due to the significant differences explained above. The consequences of Bosman ruling acceptance is reviewed and analyzed by Simmons (Simmons, 1997).

Nowadays, football is one of the most popular and world-wide spread sport. Table 1 demonstrates the first twenty team stadiums with the highest numbers of average game attendance (Transfermarkt.de)

Table 1

Attendances 21/22

#	Stadium	Capacity	Average	Matches	Capacity
	Total:	823.689	787.48	258	95.20%
1	Old Trafford	74.879	73.02	10	97.50%
2	Tottenham Hotspur Stadium	62.062	55.06	13	88.70%
3	Emirates Stadium	60.704	59.717	15	98.40%
4	London Stadium	60.000	57.956	13	96.60%
5	Etihad Stadium	55.017	52.633	14	95.70%
6	Anfield	54.074	53.017	14	98.10%
7	St James' Park	52.338	51.249	14	97.90%
8	Villa Park	42.682	41.859	12	98.10%
9	Stamford Bridge	40.853	37.758	12	92.40%
10	Goodison Park	39.571	38.799	11	98.10%

11	Elland Road	37.89	36.257	14	95.70%
12	St Mary's Stadium	32.384	29.513	12	91.10%
13	King Power Stadium	32.273	31.992	14	99.10%
14	Molineux Stadium	32.05	30.523	13	95.20%
15	AMEX Stadium	31.800	30.782	14	96.80%
16	Carrow Road	27.244	26.934	12	98.90%
17	Selhurst Park	26.047	23.963	14	92.00%
18	Turf Moor	21.994	19.011	10	86.40%
19	Vicarage Road	21.577	20.573	14	95.40%
20	Brentford Community Stadium	18.250	16.864	13	92.40%

Source: Online statistical portal transfermarkt.de

Table 2 demonstrates the first 10 teams that have the highest numbers of average game attendance (Transfermarkt.de)

Table 2

Top 10 European clubs with the highest average game attendance

#	Team	Stadium	Average attendance
1	Borussia Dortmund	Signal Iduna Park	81.132
2	Bayern Munich	Alianz Arena	75.000
3	Manchester United	Old Trafford	72.569
4	FC Barcelona	Camp Nou	72.438
5	Real Madrid	Santiago Bernabeu	66.242
6	Inter Milan	Giuseppe Meazza	65.800
7	FC Schalke 04	Veltins-Arena	61.293
8	Tottenham Hotspur	Tottenham Hotspur Stadium	59.485
9	Celtic	Celtic Park	57.821

| 10 | Atletico Madrid | Wanda Metropolitano | 57.293 |

Football is popular not only as a professional sport, but also as a hobby or the sport for health. A lot of parents choose football as a sport for their kids, and it can be explained not only by popularity of football around the world, but also by easy access:

1. No age limits
2. Low price of entrance: "shoes, pants and t-shirt – all your kid needs for joining local football club" (Zakharov, 2010)

However, the research put the emphasis on the analysis of professional associate football which has a lot of concepts, rules, and features. Modern professional football is not only a game, but also the big market including different organizations, team clubs, players, free agents, stuff, regulating organs, etc.

Increasing popularity of professional football has caused the stable income growth rate among all clubs, but especially European Premier leagues teams. During last 20 years the most popular European clubs have increased their incomes by almost 6 times and have doubled their income only during last decade (Graph 1)

Graph 1

Total income of professional clubs in Europe, €b

■ Total income
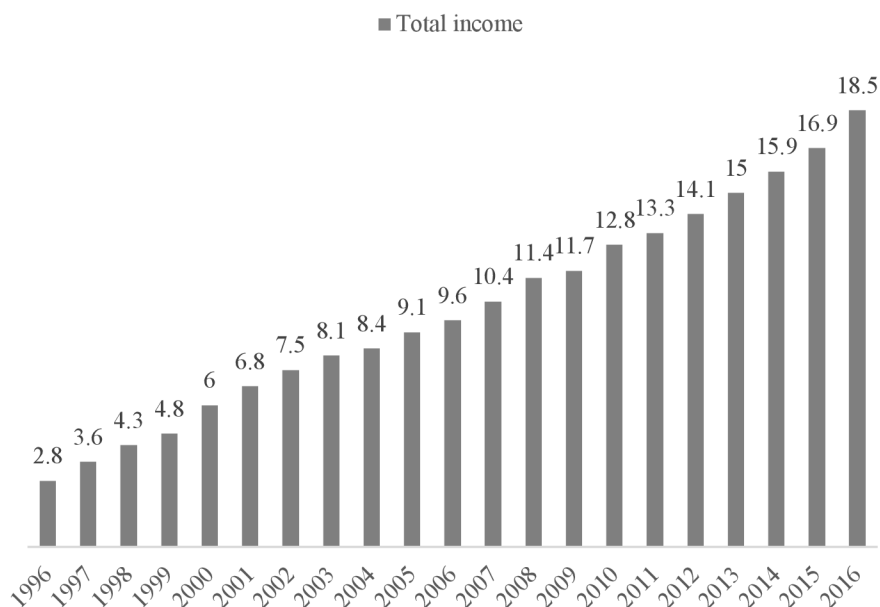
Source: Deloitte. Rising Stars: Football Money League, January 2018

The income of the professional football team is based on several different flows (Deloitte, 2018):

1. Domestic TV – the revenue from the sale of broadcasting rights
2. Sponsorship and commercial – income from sponsors, sales of club merchandise, contracts for advertising, etc
3. Gate receipts – sales of tickets for games / tournaments
4. UEFA competitions – participating in UEFA tournaments
5. Other

To sum up, all finance inflows (graph 2) – incomes of professional clubs in Europe – could be divided into three key categories (Deloitte, 2018):

1. Matchday: all money club receives in the exact day of game
2. Sponsorship, advertising, contracts

3. Broadcast

Graph 2

Revenue growth of top 20 clubs (2013/14-2018/19) (€m)
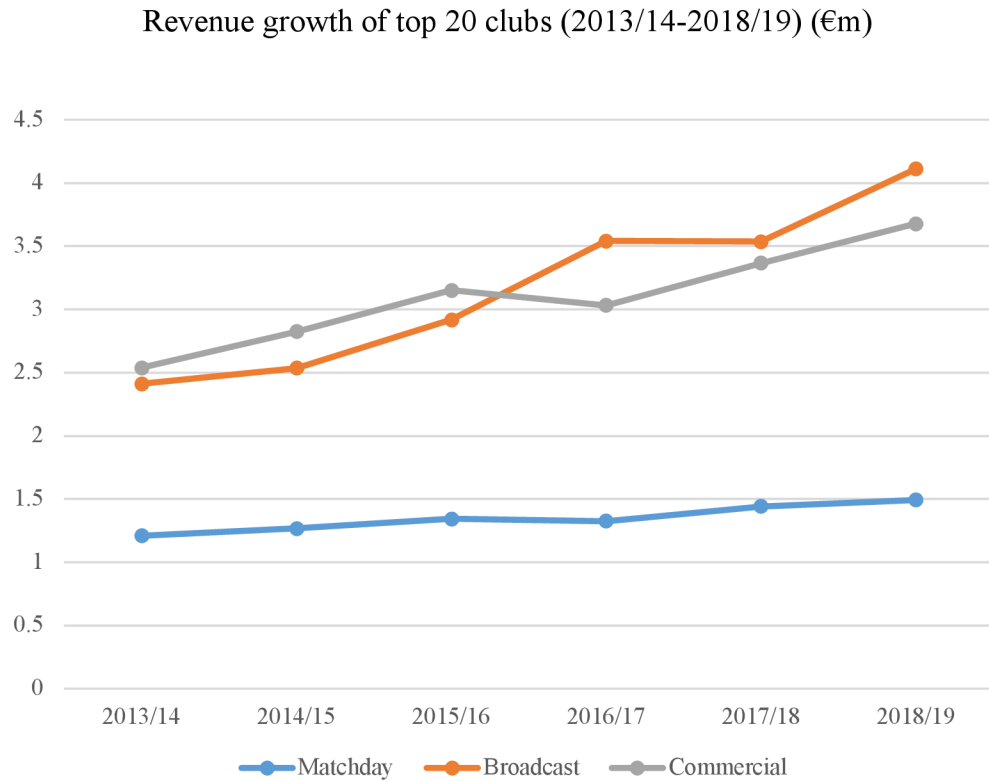
Source: Deloitte. Rising Stars: Football Money League, January 2018

Incomes and spending of professional football clubs are regulated not only by the management of the club itself, but also by the external regulating organizations. Union of European Football Associations maintains strict control over the financial activities of the clubs: to ensure the break-even of the teams and the greatest efficiency in professional football, the "fair play" rule must be applied. Fair play rule means a positive difference between income and expenses: clubs are required to make more money every year than they spend (UEFA.com)

However, there are special conditions which allow the club to avoid the fair play rule: the official owner of the club is allowed to cover losses in volume not higher than 30 million euro. Moreover, UEFA does not count the expenses for infrastructure improvement: for

27

example, budget deficit caused by high expenses for football field improvement would not result in UEFA fines (UEFA.com)

On top of financial fines, UEFA has the right to exclude the football club from the prestige football competition – Champions League. Champions League is one of the most popular and well-known football tournaments happening in Europe.

Moreover, in the list of potential "sanctions" that the team can face after breaking the rule of fair play there are reprimand, withdrawal of points, deprivation of awards and trophies, etc.

Based on the data from UEFA report "The European Club Footballing Landscape", as of February 2017, among all clubs of five* main Premier leagues of Europe *(*Premier League / England; Bundesliga / Germany; La Liga / Spain; Ligue 1 / France; Serie 1 / Italy)*, only England keeps the budget surplus after the winter transfer window 2016/17 (table 3)

Table 3

Football club net debt data

№	Country	Net debt, m euro	Net debt as % of total income	Average net debt per club, m euro
1	England	1.680	38	84,0
2	Italy	1.141	60	57,1
3	Turkey	716	110	39,8
4	Portugal	586	170	32,5
5	Russia	487	66	30,5
6	France	523	37	26,1
7	Spain	478	23	23,9
8	Denmark	174	122	14,5
9	Ukraine	168	96	12,0
10	Fermany	142	6	7,9

			Mean	409,25	72,8	32,83

Source: The European Club Footballing Landscape. Club Licensing Benchmarking Report, Financial Year 2015 / UEFA report

Almost all professional clubs in Europe face enormous expenses: renting and purchase of new team members are the most significant spending of the professional team. In average, the professional club in Europe spends about 21% of its income for transfers and new players contracts (Table 4).

Table 4

European professional clubs' expenses for transfers

№	Country	Club	Transfer expenses, m euro	Transfer expenses as % of total income
1	England	Manchester United	131	19
2	France	Paris Saint-Germain	87	17
3	England	Manchester City	92	16
4	Italy	Intenacionale Milan	86	35
5	Italy	Milan	54	23
6	Italy	Juventus	65	13
7	Spain	Barcelona	69	7
8	England	Chelsea	91	9
9	England	Arsenal	72	8
10	England	Queens Park Rangers	36	30
11	Italy	Napoli	47	24
12	England	Sanderland	32	20
13	Турция	Galatasaray	27	18

14	Germany	Wolfsburg	32	14
15	Spain	Real Madrid	105	4
Mean			68,4	21,3

Source: The European Club Footballing Landscape. Club Licensing Benchmarking Report, Financial Year 2015 / UEFA report

Transfer value - the amount of money for the transaction for the transfer of rights to use the services provided by a particular player between two counterparties (Rujig, van Ophem, 2015). In addition, mostly the counterparties are professional teams, but also the person himself of special football agency can be the counterparty.

Interest in studying the transfer market is partly due to the openness and public availability of information: the details of each match, each player and all transactions in the market are not hidden information, are available to everyone and are subject to constant monitoring and criticism from the outside. The data is also carefully collected and processed. All this makes it possible to freely and easily obtain all the information that is necessary for research, including the most accurate figures and data on every significant and insignificant aspect of football, which is especially attractive to experts and scientists.

2.5. Literature review

Transfer value is often used as the independent variable: in different research transfer value is investigated as the factor which influences on the dependent variable. For example, transfer value of football player was used as endogenous variable in the research of Dobson (Dobson et al., 2000), where the productivity of player on football field was investigated as dependent variable. Among transfer value, the salary of football player was also included into the model as the factor which could have the influence on the player's productivity. The hypothesizes describing the possible influence of salary and transfer value on the achievements

of player were analyzed based on the real data about players of half-professional clubs in England.

However, it must be noted that most researchers are concentrated exactly on analyzing the determinants of transfer value itself. Mostly, the real transfer value is used for the research, but some analysts switch to using the natural logarithm of transfer value, what is justified by the difference in the distribution of the dependent variable from the normal one.

Natural logarithm of transfer value is used as the dependent variable in the research based on the data from professional leagues of Germany and England (Dobson et. al., 2004; Carmichael et. al., 1999; Feess et al., 2004). To analyze the transfer value over the years (more than one transfer window), all transfer values were changed into corresponding values of the first time period: this action allowed to analyze the transfer value of Bundesliga (German Premier league) players from 1984 to 2000. All transfer values were switched to prices of 1983-1984 transfer window, and the natural logarithm of transfer value was used as the dependent variable in the model for analyzing the determinants by Ordinary Least Squares method (Frick, Lehmann, 2001).

Ordinary Least Squares method is one of the most common used methods for investigating the determinants of transfer value during the period after Bosman ruling application.

This method of empirical analysis was successfully applied in the work of Dobson, Gerrard and Howe (Dobson, et. al. 2004), where the factors influencing the transfer value of players in England were investigated: the authors came to the following conclusions: a significant positive impact on transfer prices is achieved by the age of the player, goals scored in previous seasons, the average number of spectators at matches (matches of both sides: seller and buyer). The variables such as the squared age of the player and the difference between scored and missed goals over the last two seasons have a significant negative impact on the transfer value. This research is also worth mentioning as the analysts included not only the

personal characteristics of player, but also the data about football teams itself: finances, rating of clubs (seller Dobson, Gerrard and Howe, 2000and buyer), etc.

But it is worth noting that this research stated above (Dobson, Gerrard and Howe, 2000) can only be used as a starting study, since the authors chose a small number of variables, respectively, many important variables were not taken into account. Also, the data used in the research contains extremely small number of observations, which can be explained by the study of non-professional football by the authors. Therefore, the results achieved in the analysis are not perfectly correct.

A similar dependent variable (transfer value) was estimated using the ordinary least squares method by Frick and Lehmann (Frick and Lehmann, 2001): the results were partially like previous research mentioned. The difference of this analysis is the categorization of teams-sellers by geographic location and usage of categories as dummy variables.

Positively significant coefficients were the age, number of games and goals in a career of player, participation in international tournaments. Regarding geography, the location of the sales team in Western Europe and South America had a positive effect on the transfer value. Sellers from the "junior" divisions of Germany, as well as from Asia and North America, had a negative impact on the transfer value (Frick and Lehmann, 2001).

Moreover, not only the geographic characteristics of the team-seller are used in the research of transfer value determinants. Some analyses contain the variables about the original country of the player, his race, or the skin color. For example, the analysis of Bundesliga transfers from 1994 to 2000 provided the empirical confirmation that the players from South America are more valuable on the transfer market and get higher transfer value while signing new contract (Feess, Frick, Muehlheusser, 2004).

In addition, the transfer value can be significantly increased by the competition of the clubs bidding for the specific player: if the clubs competing for buying one player are the rivals

or "enemies", then the question of buying often becomes a matter of principle, and clubs can (un)consciously "pump up" the price of a player in the process of competing.

Race of the player is not often added as the independent variable into the models analyzing the transfer value of football players. However, the first research, where the player's race was used as the possible determinant of transfer value, empirically refutea assumptions of racial discrimination in the transfer market against athletes who have different skin color (Reilly, Witt, 1995).

Similar results have been obtained in further studies using other data, for example, the author of the analysis repeated the study of Reilly and Witt on other data (Medcalfe, 2005) and confirmed that there is no racial discrimination in the transfer market in the Premier League of England.

The research of two Russian authors also contains the application of the ordinary least squares method (Polyakov, Zhukova, 2013). The key difference of this study lies in the categorization of the regressors characterizing the "human capital" of the player into two points:

- Sport value – the ability of player to help the team with achieving higher results
- Publicity level – the ability of player to attract the attention to the games he participates in

In the research (Polyakov, Zhukova, 2013) it is stated that two categories of players' human capital both have significant value in terms of club's strategy. If the club aims on the profit maximization, the level of publicity plays higher role. Under the goal of the better results, the sport value (skills and competencies) are more important for player.

Using the ordinary least squares method on data of 976 football players collected on transfermarkt.de, the hypothesis of the significance of the level of publicity was confirmed, although the authors note that the method, they used to assess the popularity of a player (the

number of mentions on twitter), is a rather rough method and requires further adjustment (Polyakov, Zhukova, 2013).

The Transfermarkt resource is very often used by researchers to collect data for the analysis. The resource brings together football fans and experts around the world and has six levels of verification of information that comes from various sources. All data is carefully checked, and site users can be sure of the correctness and reliability of the information contained on the site.

This resource is notable for the high accuracy of forecasts for the transfer and market prices of players, but the calculation algorithm is not publicly available, and many works are somehow related to the algorithm of the transfermarkt website.

For example, in the research of Herm and Callsen-Bracker (Herm, Callsen-Bracker, Kreis, 2014) it was confirmed that the transfer value of players published on the site can be easily explained by the market value of the players. The authors also took into account such "new" factors for research as the activities of the media, the achievements of the player's agent and the team's coach.

Moreover, the ordinary least squares method is not the only one tool used by the analysts for the investigation of transfer value. Second method, which is also commonly used, is the two step Heckman model (Heckman, 1979). This technique is designed to deal with biased estimates that arise when evaluating the transfer value using the least squares method.

The bias in the estimates arises due to selectivity: when evaluating the transfer price, only the players that have made the transfer get into the sample. In this case, players who did not change teams are excluded from the analysis, therefore, the sample becomes truncated and cannot represent the entire reality.

This problem was investigated in detail and fixed in 1999 (Carmichael, Forrest, Simmons, 1999), where the authors on the data on transfers in the English Football League in

the 1993-1994 season, using the two-step Heckman procedure, empirically confirm the positive significant effect of such variables, like age, number of successful goals in various championships and tournaments, number of career games.

The assumption about negative impact of squared age on the transfer value was confirmed. Same results about the negative influence of the variable of squared age have been achieved in other different papers (Frick and Lehmann (2001); Dobson, Gerrard, Howe (2000); Feess et al. (2004)). Also, among the results, it was noted that the participation of the selling club in any divisions below the premier league negatively affects the transfer value.

Moreover, this research is one of the first, where the specializations of the players (goalkeepers, defenders, midfielders, forwards) were considered.

The position of player is often taken into account by the analysts, the categorial variable of the player's position can be found in many papers, but mostly the researchers do not divide the analysis into two or more models for different types of players. It should be mentioned that football is a highly specialized field of activity, and some indicators or achievements would be important for attacking players, and completely different parameters are critical for defense players.

Common characteristics for all players can be:

- – Age
- – Height
- – Weight
- – Successful passes
- – Successful dribbling
- – Number of games played and etc

For players playing in attack and for attacking midfielders there are special characteristics that should be precisely investigated:

- Goals

- Assists

- Shots on target

For defenders in general successful tackles, fouls, clearance, offsides, yellow and red cards, successful blocks should be taken into account.

If all players (no matter which position they play on) are estimated under one econometric model, the results (estimates of the model) might be unreliable. The problem of wrong results can arise, for example, the sample is shifted towards a larger number of defending players, therefore, indicators such as the number of goals or assists might be insignificant or have a negative effect. Obviously, if the sample contained more forward players, the impact of goals on the transfer value would be rather higher and positive.

The solution to the problem can be to build a number of similar models with a different set of regressors for each of the categories of players (it is possible to combine attackers with attacking midfielders, defenders with defensive midfielders), as well as using the joint significance of the coefficients (taking into account the influence of a certain variable only for certain players).

A similar method as in Carmichael, Forrest and Simmons' analysis (1999) – Heckman's two-step procedure was also used to correct for biased estimates in "Determinants of football transfers to estimate the transfer value of football players in the top division of England" research (Ruijg, van Orphem, 2015).

A striking feature of the results obtained in this study is the paradoxical fact about the absolute insignificance of such a regressor as the number of goals scored. This fact can be explained exactly by sampling bias problem stated above: it is possible that most of the players included in the database were defenders, respectively, for them the number of goals scored plays a lesser role.

Many researchers focus on key variables, the inclusion of which in the sample is clear to every person, regardless of the level of knowledge in the field of football. But it is worth considering in the analysis such little-known factors as the percentage of successful passes, the success of long and short passes, tackles, dribbling, saves (for goalkeepers), speed and acceleration.

To sum up, in most studies, among the independent variables, there are a lot of common characteristics included. Thus, in almost all studies, the following factors are mentioned among the regressors:

- Age of player
- Age squared
- Number of goals achieved in previous season
- Number of games participated in previous season
- Height and weight of player (or combination of both factors as Body Mass Index – BMI)
- Number of goals achieved in international tournaments
- Number of goals achieved in national tournaments

Moreover, it is worth including variables in the models that were not taken into account in previous studies or were used only in some:

- Race and skin color: Reilly (1995); Medcalfe (2005)
- Stadium capacity: Dobson et al. (2000)
- Difference between missed and achieved goals: Dobson et al. (2000)
- Geographic location of club-seller: Frick et al. (2001)
- Popularity or fame of player: Polyakov, Zhukova (2013)
- Contract terms: Tervio (2006); Frick (2011)
- Player's position: Carmichael et al. (1999)

All the studies described above are related to the study of the economics of sports: the authors of these studies have focused on compiling models for determining the transfer value of player, depending on his personal characteristics and external factors. Research methods and sampling are used as a methodological basis for collecting data and building a model in this study. An extensive number of studies on the topic of the economics of sports and the transfer market have made it possible to determine the most relevant methods for assessing the transfer value for this study, taking into account all errors and comments.

3. Practical Part

3.1. Data

Currently, there are significant changes in the political arena and in the economic sphere, but the popularity of football remains at a consistently high level in European countries, regardless of external factors.

Analyzing the contracts of players and transfer markets of different countries, it should be noted that the most expensive football players in the world are concentrated exactly in the European football teams: market and transfer values of European players are much higher than in other countries. It is also worth noting that European clubs have the largest number of fans around the world. This feature makes the European transfer market extremely interesting for analyzing.

Despite the regulation of the ratio of income and expenses of professional clubs, the leading teams in Europe consistently allocate a large amount of money from the budget for the purchase and rent of players on the transfer market.

Most professional athletes sign contracts with clubs with help of special football agents whose activities are aimed at maximizing profits and benefits from transactions for the team, for the agency and for the player, therefore, neither party seeks to minimize the cost of transferring (purchasing or leasing) an athlete. Often, the selling team and the player's agents "wind up" the value of the player before a potential sale, when the interest of other teams in the player is obvious.

Along with the efforts of the selling team and agents, the interest in the player and the growth of the transfer value can be carried out in uncontrolled ways, for example, when two competing teams or teams that are leaders in their national tournaments enter the auction for a player. Such cases can lead to a surge of interest from the rest of the teams, even from other

countries, as increased interest from some clubs can increase the player's attractiveness in the transfer market.

For the analysis in this work, the data on football clubs in Europe from the top divisions (main tournaments) is used, since the matches of the main leagues of European countries attract the most attention from spectators and fans around the world, as well as data on European players is the most complete and easily accessible. A lot of websites and portals are engaged in an overview of all matches and players in the smallest detail, what makes possible to assemble a complete database.

For this study, information about the players of European professional football clubs of the top division is collected: the sample includes players from Spain, Italy, Germany, France, England from the 5 leading football leagues:

- Premier League (England)
- La Liga (Spain)
- Ligue 1 (France)
- Bundesliga 1 (Germany)
- Serie A (Italy)

Players from other divisions of the selected countries were not included in the study for the following reasons:

Firstly, there is the problem of the incompatibility of players in lower divisions with players in the higher leagues. Often, players from lower divisions cannot attract the attention of agents, other teams and the club's coaching staff, because team management chooses more experienced, reliable and well-known players to participate in championships and matches, therefore, data on the characteristics of the player, his abilities and experience will not be reliable: perhaps if the player had more opportunities to prove himself on the field, his success on the field would be commensurate with the success of the main players of the team, but since lesser-known players are released on the field less often by the club, data on their productivity and sporting success may be underestimated in comparison with other players.

Secondly, comparing players from lower leagues with players from the "top" leagues in Europe will worsen the results of the study, since, as mentioned earlier, the performance of players from different leagues is drastically different.

To analyze players from lower divisions, a separate study should be carried out, since not only the characteristics of athletes differ significantly, but also the characteristics of teams, tournaments and the transfer market itself as a whole.

The study focused on the determinants of the transfer value of players acting in the positions of attacker, attacking midfielder, defensive midfielder and defender. The sample does not include data on goalkeepers, since their transfer value depends on a number of other factors that are unsuitable for analyzing the value of other players on the transfer market (number of shutouts, goals conceded, saves, etc.). This exception does not limit or "spoil" the results of the study, but, on the contrary, provides an opportunity for further analysis and expansion of activities in the field of analyzing the economics of sports and the football transfer market in particular.

As potential determinants of the transfer value of football players, variables below are chosen: the list includes data that determine the player in general, the characteristics of his team, the physical parameters of the athlete and his experience.

1. Physical parameters of player
   a. Height of player (in centimeters)
   b. Weight of player (in kilograms)
   c. Age of player (in years)
2. Characteristics of player: his abilities and experience
   a. Position on a field – categorial variable – the position of player (forward, attacking midfield, defensing midfield, midfield)
   b. Goals – number of goals scored by player in his main league matches during the previous playing season, in relation to 90 minutes of time played

c. Assist – number of assists made by player in his main league matches during the previous playing season, in relation to 90 minutes of time played

d. Key passes – number of ineffective (after which a goal is not scored) passes in relation to 90 minutes of the athlete's playing time. Reflects the number of "chances" created by a player in a match

e. Fouls - the number of player's fouls in relation to the athlete's 90 minutes of playing time

f. Minutes – time played in matches of the player's league in minutes

g. Yellow cards – number of yellow cards that were given to player during participating in the league matches in relation to 90 minutes played

h. Red cards – number of red cards that were given to player during participating in the league matches in relation to 90 minutes played

i. Dribbling – number of successful dribbling in relation to 90 minutes played

j. Interceptions – number of interceptions successfully made by player in league tournament related to 90 minutes played

k. Clearances - the number of times a player has kicked the ball away from the penalty area of his goal into the center of the field or into part of the opponent's field, in relation to the player's 90 minutes of playing time

l. Loss – the number of moments when, in the process of fighting with an opponent, the player lost the ball, in relation to the 90 minutes of the athlete's playing time

3. Team characteristics

a. FIFA rating of the country, which national team the player is the part of

b. Main coach change – binary variable – if the main coach has been changed during previous season (1 – change; 0 – no changes)

The study of the determinants of the transfer value of defenders, central players and attackers is not equivalent, since completely different variables will be important for defensive

players than for attacking players. Of course, in football terminology there are many terms for the position of a player on the field, but in this database all players are divided into 4 categories:

- Defenders
- Defending midfields
- Attacking midfields
- Forwards

To obtain the most reliable coefficients, the entire base of football players should not be estimated on the basis of a single set of variables, but should be divided into at least two categories of football players and the variables that are the most important for each of the following categories should be selected:

- Attacking players (forwards and attacking midfields)
- Defending players (defenders and defending midfields)

For both categories there are similar variables selected:

- Age
- Height
- Weight
- Minutes played
- Losses of the ball
- Successful interceptions
- Successful dribbling
- Successful air play
- Assists
- FIFA rating
- Change of coach

For attacking players, the supposedly important variables to be included in the model are:

- Goals
- Key passes
- Relationship of scored goals to all shots

The following unique variables were chosen for defense players:

- Yellow and red cards
- Fouls
- Offside
- Clearances
- Interceptions

To obtain reliable estimates for each category of football players, one of two strategies in building models should be followed:

1. To build 2 or more separate models for each type of player (to include special (unique) list of variables to each of model)
2. To build one common model and include all players, but to use the joint significance of the variables (the joint significance is calculated using the multiplication of the variable by the dummy variable characterizing the position of the player on the field)

In this study, to calculate the impact of variables on the transfer price of different categories of players the entire database is divided into two sub-samples, the first of which will include all players who play mainly in defense, and the second will include players who play in attack. This will simplify not only the preliminary analysis of the data, but also the construction of the model and the interpretation of the results.

The final sample was divided into 2 subcategories according to the principle of dividing the specializations of players on the football field – defense players and attackers, the number of observations in the subcategories was 887 and 526, respectively.

3.2. Hypotheses

The following hypotheses for this study are formulated based on the assumptions of common sense and the studied literature:

1. the variable characterizing the height of a player will have a positive significant effect for defensive players and will not be significant for attacking players. This hypothesis arises from the assumption that height is important for defenders, for example, to protect their goal when the ball is served from the corner of the field into the penalty area by an opponent player

2. a variable that characterizes the percentage of successful dribbling will have a stronger effect on the transfer price of attacking players than defensive players. It is more important for forwards to be able to bypass opponents in the process of moving towards the opponent's goal

It should be noted that professional football, and the transfer market, are characterized by openness and accessibility of information on the required variables, due to which the solution of the research question is simplified due to the ease of searching and collecting all the data necessary for a full-fledged analysis.

The sample contains data on the players of the top football leagues in Spain, Italy, France, Germany, and England. Data on transactions, contracts, prices of football players in the markets was obtained from the open databases transfermarkt.de (German online portal) and whoscored.com, the annual reports of UEFA and Deloitte, as well as various Internet resources that post relevant information about news in the field sports and achievements of professional athletes:

- sports.ru
- championat.com
- sport-express.ru

3.3. Limitations

Naturally, some characteristics of a player cannot be estimated in numbers. With a high degree of probability, the transfer value of a player (the price that a professional club pays for the opportunity to "buy" a player) will be positively affected by the ability of an athlete to build competent strategies on the field in defense or attack, but the ability of a football player to instantly think and make decisions depending on situations cannot be assessed. A number of such variables, which cannot be calculated, can be included in further research by using proxy variables – variables that are not in itself directly relevant, but that serves in place of an unobservable or immeasurable variable (Tsyplakov, 2005).

Also, such characteristics of the player as his strategic thinking and motivation are of interest for further analysis. The most motivated players are able to produce better results than players who are not interested in moving up on the career ladder. However, it is not possible to evaluate the motivation in numbers, as well as the strategic skills of the player, without the use of additional tools, which greatly complicates the use of the players' motivation factor in the study.

Also, the fact of making a transfer or the decision to stay in the team, the player's transfer value can be influenced by his relationship with the team and the coaching staff. If a player gets along well with the coaching staff and colleagues, he may decide to stay with the team (hence he will not have an actual transfer value in the assessed transfer window). Bad relationships and lack of understanding in the team can both positively affect a player's decision to change teams and negatively affect his transfer value. The decrease in the transfer value in this case can be explained by the player's low performance on the field due to the lack of cohesion with the team, or by rare appearances on the football field at the discretion of the club's coach (which will not allow the player to fully demonstrate his skills and abilities).

These factors similarly cannot be assessed numerically at the present time, since information about the relationship in the team and with the coaching staff either rarely becomes

available to the press, or the assessment of the relationship turns out to be too subjective or unreliable.

3.4. Analysis

Before building a model, the statistical outliers must be excluded and the whole database collected from open sources should be studied in detail:

The box plots are built for both of the samples in order to exclude statistical outliers. For example, in the sample of attacking players, there are obviously some statistical outliers, as it is visible on the graph. Therefore, in the final sample only players in the age below 35 years old are included in order to avoid incorrect estimates (picture 1).

Picture 1

Five-number summary of variable "age" for attacking players
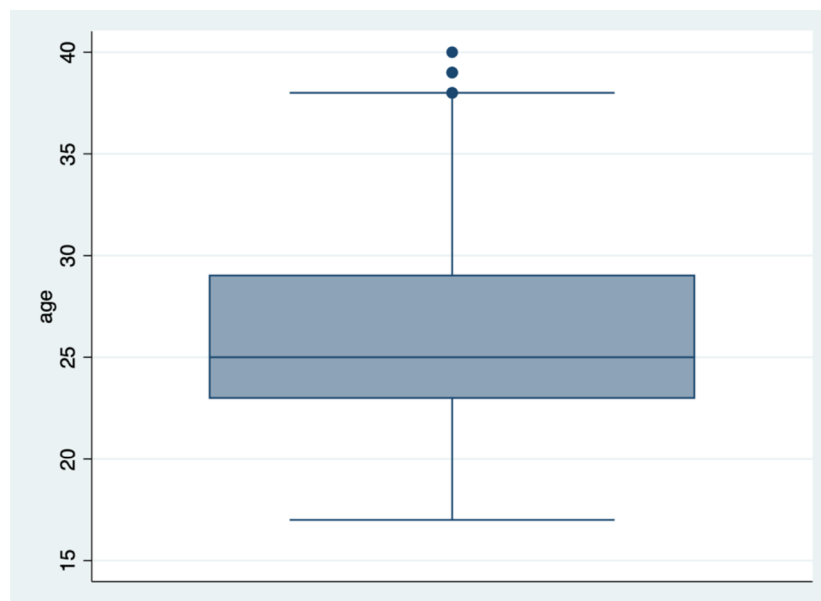
Source: own analysis in statistical package Stata

The same limitations are applied for variables, which show statistical outliers not only above the average sample, but also below: therefore, the sample contains only players whose height is above 161 cm and below 192 cm (Picture 2).

Five-number summary of variable "height" for attacking players
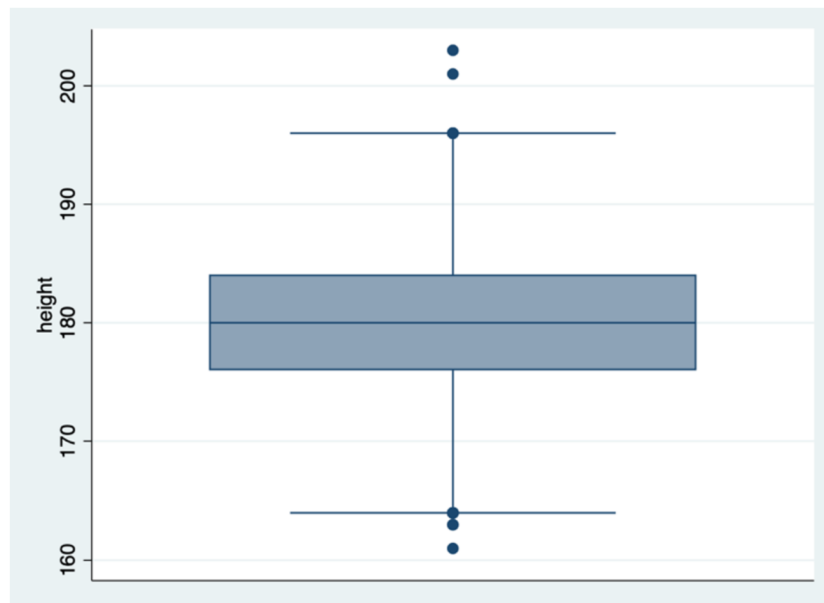
Source: own analysis in statistical package Stata

Some variables do not show the statistical outliers, so there no limits are applied: for example, there is no unique player who has made significantly more successful dribbling than other players, based on the graph below (Picture 3).

Five-number summary of variable "dribbling" for attacking players
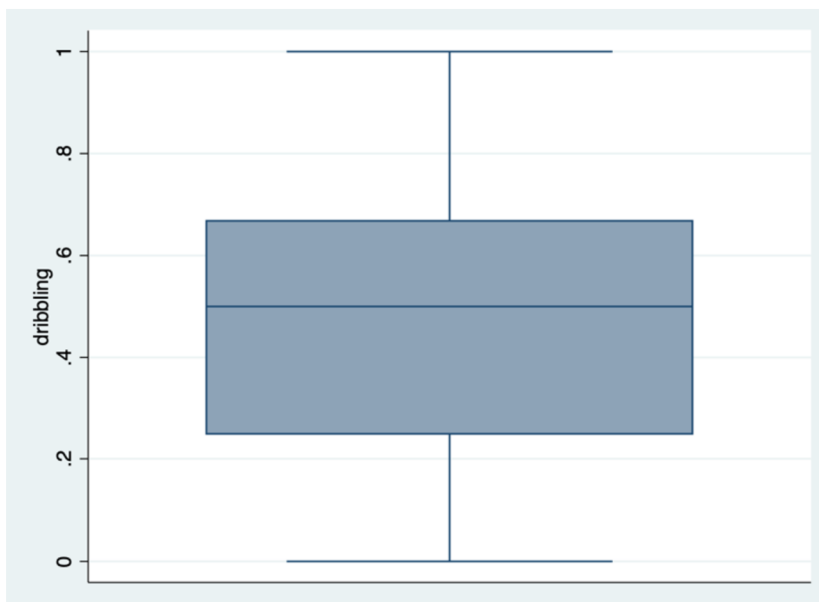
Source: own analysis in statistical package Stata

Some variables are excluded from the analysis because of the statistically significant correlation with other variables. The table contains the correlation values between variables included into sample of defenders. Based on the numbers obtained, the variables "fouls", "clearance" and "offside" are excluded. Appendix contains the table of correlation values for players of attack. Based on the estimates obtained (Appendix 1), the following variables are excluded:

- Fouls
- Offsides
- Clearances

Based on the data analysis, the average defending player, who made a transfer in the transfer window 2018/2019, is in the age of 27, has 183 cm height, is valued for 3 million 370 thousand 290 euro. The average FIFA rating of the national team is 20. In average, during one season the player spends 606 minutes playing on a field, makes successful dribbling in 50%

cases, wins in air fight in 55% cases. Moreover, in relation to 90 minutes of playing time, the player makes 0,04 assists, 0,58 times he loses the ball, 0,08 times goes to offside, 0,7 times successfully takes the ball from the opponent, 1,09 times makes a foul, 3,37 times clears the penalty area from the ball, gets 0,22 and 0,02 yellow and red cards accordingly.

The defending player, who did not make a transfer in the stated transfer window, has the similar height, but does not have real transfer value. The national team he plays in has a bit higher FIFA rating (18), and in average, the player spends the same time playing, but makes successful dribbling and wins air fight more often. In relation to 90 minutes played, the average player, who did not transfer to another team, gives assists more often, same as facing offside, losing ball. But on the other hand, the player less often makes fouls, clears the penalty area and gets red and yellow cards (Table 5).

Table 5

Average data about defenders

Variable	Defender (no transfer)	Defender (tranfer)
Age	27	27
Height	183	183
Transfer value	-	3370290
FIFA rating	18	20
Minutes played	606	606
Successful dribbling	0,54	0,5
Successful air play	0,56	0,55
Assists	0,06	0,04
Losses	0,60	0,58
Interceptions	0,72	0,70

Offside	0,12	0,08
Fouls	0,98	1,09
Yellow cards	0,18	0,22
Red cards	0,01	0,02

Source: own analysis in statistical package GRETL

Like the data for defenders described above, the characteristics of the average attacker are shown below (Table 6):

<div align="right">Table 6</div>

Average data about attacking players

Variable	Attacking (no transfer)	Attacking (transfer)
Age	26	26
Height	180	180
Tranfer value	-	5346297
FIFA rating	17	16
Minutes played	504	528
Dribbling	0,44	0,48
Goals	0,17	0,15
Assists	0,11	0,11
Key passes	1,23	1,26
Goals / shots	0,07	0,07
Air play	0,34	0,35

Source: own analysis in statistical package GRETL

4. Results and Discussion

4.1. Attacking players

Table 7 shows the results of evaluating the factors influencing the transfer value of a football player by the category of attacking players using the Linear Regression method and the two-step Heckman procedure.

Table 7

Attacking players estimation

	OLS	Heckman Model	
	Transfer Value LOG	Transfer	Transfer Value LOG
Indicator Variable	-	1,86*** (0,088)	-
Const	6,911*** (1,601)	-1,609 (1,577)	6,712*** (1,586)
Age	-0,023** (0,011)	0,001 (0,011)	-0,023** (0,011)
Assists	0,547* (0,287)	-0,408 (0,292)	0,539* (0,285)
Key passes	0,102** (0,043)	-0,001 (0,041)	0,104** (0,043)
Goals to all shots ratio	2,076*** (0,434)	0,499 (0,455)	2,119*** (0,431)
Air fight	-0,048 (0,239)	0,136 (0,236)	-0,049 (0,237)
Dribbling	0,926*** (0,158)	0,058 (0,156)	0,939*** (0,157)
Disposition	0,021 (0,039)	-0,001 (0,036)	0,022 (0,038)
Height	0,001 (0,009)	0,003 (0,009)	0,007 (0,009)

Mins played	0,001*** (0,000)	-0,001 (0,001)	0,001*** (0,000)
Country rating	-0,006*** (0,002)	-0,001 (0,002)	-0,005*** (0,002)
Heckman Lambda	-	-	0,231** (0,099)

Note: *** - 1% level of significance, ** - 5% level of significance, * - 10% level of significance. Standard errors are in brackets
Source: own analysis using the statistical package GRETL

The table 7 clearly demonstrates the results for the two models built. The results of the calculation show that there is a difference between the coefficients obtained by the Ordinary Least Squares method and the coefficients obtained using the two-step Heckman procedure: this difference confirms the hypothesis of a bias due to selectivity in the data of the transfer value of football players. This is also confirmed by the significance of Heckman's lambda at the 5% significance level.

An equally important result concerns the indicator variable. As an indicator variable, a dummy (binary variable) that characterizes the fact if the head coach of the club was changed during the studied playing season (1 - if there was a change in the head coach of the team, 0 - the head coach of the team did not change) has been chosen. In the table 7 it is clearly visible that the fact of changing the club's coach not only positively affects the likelihood of a player changing his club in the next transfer window, but also the obtained estimate is significant with a probability of 95%.

Almost all variables have an impact on the dependent variable (footballer's transfer value) that is in accordance with expectations.

According to the assumptions, assists and key passes have a positive effect on the transfer value of the striker, as they directly demonstrate the ability of the striker to perform his main function - to create dangerous situations and to create the opportunities for goals score. Also, assists and key passes are significant both in the results of the Ordinary Least

Squares method and the Heckman model on the 10% and 5% levels of significance accordingly.

The ratio of goals to all shots on goal made by a football player also positively and significantly (on the 1% level of significance) affects the transfer value of an attacker, since it numerically expresses the ability of a football player not only to bring the ball to the opponents' goal, but also to successfully use the chance and benefit his team.

One of the recent striking examples is the forwards of the Czech national team and the German club Bayer 04 Leverkusen, Patrick Schick. This player was considered talented and promising from the moment he played at the level of youth teams. The debut in adult football took place in 2014, Patrick played his first full season in the Czech Fortuna League team Bohemians 1904. Patrick managed to live up to his expectations and in 29 matches he scored 8 goals and gave 1 assist, which can be considered a very worthy result for a young player. Patrick attracted the attention of many clubs who appreciated the makings of a young striker. According to Transfermarkt portal, the player's transfer fee has increased 6 times: from 500,000 Euros to 3 million. It was for this amount that the player moved to the Italian Serie A team, Sampdoria, where he continued to fulfill his main role, namely, to score goals. In 35 matches of the 2015/2016 season, the player scored 13 goals and provided 4 assists.

The player was an important part of the team, but not the main one: he spent 1653 minutes on the field in 35 matches out of 3150 minutes possible. The result for the debut season is worthy, and therefore the cost of the player has again increased 5 times: from 3 million to 15 million euros. The player attracted the attention of a more status club from the same Serie A, Roma, who acquired the rights to the player for 20 million euros in 2017. In total, the cost for 2 full years: from October 2015 to October 2017 increased by 40 times.

However, his career in Roma did not work out from the very beginning. In his debut season, spoiled with injuries, Patrick scored only 3 goals for the new club and spent only 1281 minutes on the field. This may explain the drop in the value of the player to 18 million euros in October 2018. The following season, Patrick managed to get rid of health problems and increase the amount of playing time to 1745 minutes, however, the goal statistics was not greatly improved: in 32 matches in various tournaments, 5 goals were scored and 3 assists

were given. Quite modest results led to a drop in value from 18 to 15 million euros. It was for this amount that the player moved to his next team, Red Bull Leipzig, in 2019. Despite injuries still haunting the player: 1,628 minutes played in a season out of about 3,600 possible, the goal record improved significantly: in 28 matches, the player scored 10 goals and provided 3 assists. This factor spurred the increase in value from 15 to 25 million euros. In Leipzig, the player did not stay long and for the already mentioned 25 million he joined his current team: Bayer 04. The injury situation improved, Patrick managed to spend 2292 minutes on the field during the season and once again improve his goals and assists statistics. So, for the 2020/2021 season, he managed to score 13 goals and give 2 assists. The cost has risen again: from 25 to 28 million euros. Patrick`s successful performance at Euro 2021: 5 goals and a phenomenal 2021/2022 season: 20 goals and 3 assists in 24 matches and 1,702 minutes on the pitch spurred the player's transfer value from 28 to 40 million euros.

The percentage of successful dribbling positively and significantly (on 1% level of significance) affects the transfer value of a player acting as a striker, and this is also in accordance with expectations and assumptions. The ability of a football player to bypass an opponent in the process of possession of the ball increases the ability to score a goal, so this skill has a positive effect. This result corresponds to Hypothesis 2, which means that the hypothesis is not rejected with 1% level of significance.

In accordance with the assumption, the number of minutes played in the previous season has the positive impact on the transfer value. The estimate obtained is significant on the 1% level. Based on the assumption, the player, who shows up on the field more often, has more opportunities not only to demonstrate his abilities, but also to provide the real result: to score a goal, to make an assist or just to show his excellent (for example) abilities in dribbling. If the player does not show up often, his transfer value would not be increasing, as nobody is able to see the abilities and skills of player.

Presumably, the age of the player has a negative impact on the price of the player, which is confirmed by the results of the analysis. Older players show a decline in physical ability over the years as injuries accumulate and the natural aging also operates. Also, the transfer value of older players is decreasing, as young athletes with great potential and a high level of physical ability appear on the transfer market, which creates high competition for

the "oldies". Based on the results, it is clearly visible that the assumption about negative impact of the age on the transfer value is confirmed, as the variable has a negative coefficient obtained, which is also significant on 5% level.

Taken into account, that higher number in rating of countries means lower position (1 = first / best), the result obtained is under the logic. The variable of country rating has negative impact, what means that if the rating is closer to 1 (lower number), the player, who belongs to this team, gets higher transfer value, as his team shows greater results and takes the higher positions in the ranking. The estimate obtained is significant on 5% level.

4.2. Defending players

Table 8 shows the results of the analysis of data on defending players. It is worth initially noting that the results obtained by the Ordinary Least Squares method differ from the results of the 2-step Heckman model, which confirms the hypothesis about the bias of the OLS estimates.

Table 8

Defending players sample estimation results

	OLS	Heckman Model	
	Transfer Value LOG	Transfer	Transfer Value LOG
Indicator Variable	-	0.65*** (0.096)	-
Const	9.270 (0.467)	-1.492*** (0.391)	9.615*** (0.576)
Age	-0.091 (0,014)	0.019 (0.012)	-0.094*** (0.014)
Assists	1.759 (0.681)	-0.618 (0.487)	1.881*** (0.683)

Air Fight	0.454 (0.359)	0.037 (0.307)	0.464 (0.356)
Mins played	0.001 (0.001)	0.001 (0.001)	0.001*** (0.001)
Dribbling	0.364 (0.174)	-0.096 (0.141)	0.379** (0.172)
Country rating	-0.005 (0.003)	0.005* (0.003)	-0.006* (0.003)
Interceptions	-0.064 (0.063)	0.013 (0.008)	-0.059 (0.062)
Red cards	-1.039 (1.386)	0.259 (0.808)	-1.145 (1.369)
Yellow cards	-0.339 (0.287)	0.708*** (0.248)	-0.442 (0.302)
Losses	-0.026 (0.094)	0.176* (0.085)	-0.049 (0.096)
Heckman Lambda	-	-	-0.254* (0.253)

Note: *** - 1% level of significance, ** - 5% level of significance, * - 10% level of significance. Standard errors are in brackets

Source: own analysis using the statistical package GRETL

Table 8 shows the results of the analysis of data on defense players. It is worth initially noting that the results obtained by the least squares calculation differ from the results of the Heckman model, which confirms the hypothesis about the bias of the OLS estimates.

The indicator variable - the fact of changing the head coach of the club - has a positive significant impact on the change of the player of his club. The coefficient in front of the variable responsible for the fact of changing the head coach at the first step of the Heckman model is 0.65 and is significant at the 1% significance level, therefore, the probability of a transfer in the next transfer window increases with a change in the coaching

staff of the team. This result is consistent with the initial assumption that a change in coaching staff may contribute to a player's decision to change teams, or this fact may be due to the fact that the new coach's decisions and actions regarding the training process, games and team composition may force the player to leave his club.

In general, the direction of influence of almost all coefficients is in line with expectations. The following variables have a positive effect:

Assists: Despite the fact that this model evaluated the players acting in defense, for this sample, the use of a variable characterizing the number of assists given is justified. As match statistics show, assists are given equally by both attacking and defending players, which is a consequence of the strategy chosen by the head coach and the placement of players before the match. Therefore, the more assists a player gives, the higher his transfer value will be, since assists are one of the key success factors for a team.

Air fight: As expected, the more often a player wins the fight for the ball in the air, the more attractive he is on the transfer market, since it is important for defenders to be able to head the ball in a jump to protect their goal during free kicks and dangerous chances that are created by the opponent. Therefore, the positive impact of this variable on the player's price is justified.

Mins played: the more minutes a player spends on the field in a season, the more opportunities he has to demonstrate his skills and abilities on the field, therefore, his attractiveness grows. Also, during matches, there is more chance that the player will be noticed by agents of other teams, the demand for the player will increase, which will affect the interest of teams in the player and the growth of his transfer value.

Dribbling: Also important is the skill of possession of the ball and the ability to bypass opponents. The more often a player makes successful strokes of opponents, the higher the percentage of successful dribbling of a player, the higher his transfer value, since the ability to get around opponents is the first element in the implementation of an attack, because it is the defenders who must throw or move the ball through the formation of opponents from their goal or from the center of the field to towards the attacking players. The coefficient confirms Hypothesis 2.

The following variables have a negative impact on the transfer value, according to those obtained in the Heckman model:

- Age
- Country rating
- Interceptions
- Red cards
- Yellow cards
- Losses

A player's age appears to have a negative effect on the transfer value of both offensive and defensive players. The older the player, the lower his transfer value due to deteriorating physical abilities due to the accumulation of injuries and increased competition in the transfer market, as new young players appear who can become worthy replacements for "aging" players.

Also, the frequently encountered aggressive play by defenders leads to yellow cards and red cards, which is an integral part of the actions of defensive players during the game, but often such moments lead to a decrease in the player's transfer value. Receiving yellow and red cards can result in a player being sent off, which will negatively affect the team's ability to win or not lose to the opponent, so players who are often penalized by the referee for "tough" play are characterized by less value and usefulness for the team, respectively, cost less on the transfer market.

The country rating (the rating of the player's national team) has a negative impact, since the value of this indicator increases when the actual rating decreases. Therefore, an increase in the value of the indicator should lead to a decrease in the player's transfer value. This result similarly confirms the initial assumptions about the direction of influence of this variable.

The number of ball losses is expected to have a negative impact on a player's transfer value, as a defending player must be able to keep the ball when opponents are trying to score a goal. If the defender often loses the ball during the game, the probability of

conceding a goal increases many times. Therefore, the defenders, who are not able to protect the team because they lose the ball more often, become less pricy on the transfer market.

5. Conclusion

The research contains the analysis of the transfer market in Europe, namely England, France, Spain, Italy, Germany Premier Leagues. The main purpose of this research is to determine the influence of various factors on the transfer value of players in the top football leagues of the countries above.

The main premise of this analysis is the assumption that there is a bias in the estimates that are calculated by the Ordinary Least Squares method. This shift is explained by the features of the football transfer market.

During the period of transfer windows (for example, at the end of the playing season), a player can make a transfer from his team to another for a certain price, called the transfer fee. Naturally, before the expiration of the current contract, not all players change their team to another, respectively, for these players researchers cannot observe the actual transfer price. Using the least squares method, it seems possible to estimate the dependent variable - the transfer price - only for those players who have a real transfer price, that is, who have made the transition. However, those players who remain in their team at the end of the transfer window for any reason have a potential transfer value, which is determined by supply and demand in the market. These players could have a specific price in the market if they made the transition, but this price is currently unobservable.

Estimating only the players who made the switch is incorrect, since such a sample base does not represent the population as a whole. Estimates obtained by this method are unreliable (biased and inconsistent) because they are affected by the consequences of the sample selection problem.

The solution to the problem of sample selectivity is the construction of the Heckman model - a two-step Heckman procedure - which is aimed at correcting the unreliability of the least squares estimates. The use of this model is theoretically and empirically justified, and is also confirmed by various qualitative econometric studies of previous years. The construction of the Heckman model is carried out in two stages:

At the first step, the probability of a football player changing his club is estimated using the probit model (probabilistic model). At this step, it is mandatory to include an additional variable that has a putative influence on the decision to change clubs but does not have a putative influence on the dependent variable of the second step. This additional variable is called the indicator variable.

The second step is to build a linear regression, the dependent variable is the transfer value of the players. The bias is corrected by including the equation of the fact of transferring to another club from the first step into the second equation for modeling the transfer cost.

The Heckman model was applied in this work along with the least squares method to correct bias due to selectivity and compare results to prove the presence of the mentioned bias.

The analysis of players' prices in the transfer market was carried out on the basis of athletes from five key leagues in Europe (England, Spain, Italy, France, Germany). The final sample was divided into 2 subcategories according to the principle of dividing the specializations of players on the football field - defense players and attackers, the number of observations in the subcategories was 887 and 526, respectively.

As independent variables, the personal characteristics of the player are used, such as his physical parameters and sports skills), the characteristics of the player's team, the characteristics of the player's national team. The change of the head coach of the team was chosen as an indicator variable at the first step of the simulation using the Heckman procedure. Data collected from public portals on the Internet.

The results obtained using the Heckman model are consistent with expectations and confirm the hypotheses put forward. The estimates obtained using the Heckman model differ from the estimates of the least squares method, which confirms the assumption that there is a bias. Heckman's Lambda - the equation for the probability of moving to another club added in the second step - turned out to be significant, the estimates were adjusted, therefore the problem of estimation bias was eliminated in both subsamples.

The indicator variable turned out to be significant in the club change probability equation for each of the two subsamples, the fact that the head coach of the club has a change positively affects the likelihood that a player will change teams during the transfer window.

The direction of influence of almost all variables on the dependent variable coincided with expectations. The statistical significance of Heckman's lambda and the difference in the coefficients of the LSM and Heckman models confirm the rationality of using a two-step procedure to obtain reliable estimates. The bias issue due to selectivity has been eliminated for both subsamples.

It should be noted that a complete understanding of the transfer price formation mechanisms is impossible, since many factors that supposedly affect the transfer price are unobservable or incalculable, which directly affects the quality of the model. Among these factors, it is worth highlighting the player's motivation, team relationships, relationships in the player's family, and the geographical location of his family. The inclusion of these factors in the model may have improved the quality of the model, which cannot be confirmed or refuted at this stage.

Also, further analysis can be directed not only towards expanding the set of explanatory variables, but also towards studying players from other countries or lower divisions. Comparing the results of various models will provide a picture of the transfer market as a whole.

6. References

1. Aguirregabiria, V. (2009) "Some Notes on Sample Selection Models," MPRA Paper 15974, University Library of Munich, Germany.

2. Andreff, W., & Szymanski, S. (Eds.). (2006). *Handbook on the Economics of Sport*. Edward Elgar Publishing

3. Baroncelli, A., & Lago, U. (2006). Italian football. *Journal of sports economics*, 7(1), 13-28.

4. Behr, P., Guettler, A., & Truebenbach, F. (2012). Using industry momentum to improve portfolio performance. *Journal of Banking & Finance*, 36(5), 1414-1423.

5. Carmichael, F., Forrest, D., & Simmons, R. (1999). The labour market in association football: who gets transferred and for how much?. *Bulletin of Economic Research*, 51(2), 125-150.

6. Dobson, S., & Gerrard, B. (1999). The determination of player transfer fees in English professional soccer. *Journal of Sport Management*, 13(4), 259-279.

7. Dobson, S., Gerrard, B., & Howe, S. (2000). The determination of transfer fees in English nonleague football. *Applied Economics*, 32(9), 1145-1152.

8. Feess, E., & Muehlheusser, G. (2003). The impact of transfer fees on professional sports: an analysis of the new transfer system for European football. *The Scandinavian Journal of Economics*, 105(1), 139-154.

9. Feess, E., & Muehlheusser, G. (2003). The impact of transfer fees on professional sports: an analysis of the new transfer system for European football. *The Scandinavian Journal of Economics*, 105(1), 139-154.

10. Feess, E., & Muehlheusser, G. (2003). Transfer fee regulations in European football. *European Economic Review*, 47(4), 645-668.

11. Feess, E., & Muehlheusser, G. (2003). Transfer fee regulations in European football. *European Economic Review*, 47(4), 645-668.

12. Frick, B. (2007). The football players' labor market: empirical evidence from the major european leagues. *Scottish Journal of Political Economy*, 54(3), 422-446.

13. Giulianotti, R., & Robertson, R. (2009). *Globalization and football. Sage*.

14. Greulich K. (2013). Transfer costs of human capital in the English Premier League. Final Thesis

15. Hautsch, N., Lehmann, E., Warning, S., & Frick, B. (2001). *Shirking or mismatch? Coach-team separation in German professional soccer* (No. 313)

16. Heckman, J. J. (1977). Sample selection bias as a specification error (with an application to the estimation of labor supply functions). *Econometrica*, 47(1), 153-161

17. Herm, S., Callsen-Bracker, H. M., & Kreis, H. (2014). When the crowd evaluates soccer players' market values: Accuracy and evaluation attributes of an online community. *Sport Management Review*, *17*(4), 484-492.

18. Kapuscinski, R. (2013). The soccer war. *Vintage*.

19. Medcalfe, S. (2008). English league transfer prices: is there a racial dimension? A re-examination with new data. *Applied Economics Letters*, *15*(11), 865-867.

20. Polyakov, K., & Zhukova, L. (2013). Human capital estimation in professional football. *Applied Econometrics*, *29*(1), 29-44.

21. Reilly, B., & Witt, R. (1995). English league transfer prices: is there a racial dimension? *Applied Economics Letters, 2(7)*, 220-222.

22. Ruijg, J., & van Ophem, H. (2015). Determinants of football transfers. *Applied Economics Letters, 22(1)*, 12-19.

23. Simmons, R. (1997). Implications of the Bosman ruling for football transfer markets. *Economic Affairs,* 17(3), 13-18.

24. Terviö, M. (2006). Transfer fee regulations and player development. *Journal of the European Economic Association, 4*(5), 957-987.

25. Tsyplakov, A. (2005) "В помощь изучающим эконометрику. Мини-словарь англоязычных эконометрических терминов, часть 2", *Quantile 5*, 41-48

26. Van den Berg E. (2011). The valuation of human capital in the football player transfer market. *Financial Economics Erasmus School of Economics*

27. Zakharov, I.. (2010). How much does it take to grow a champion? *Forbes*

Regulations and normative legal acts

28. Regulations on the Status and Transfer of Players. Fédération Internationale de Football Association, (www.FIFA.com)

Online sources

29. www.championat.com

30. www.FIFA.com

31. www.sport-wiki.org

32. www.sportbox.ru

33. www.sports.ru

34. www.transfermarkt.de

35. www.whoscored.com

Reports

36. The European Club Footballing Landscape. Club Licensing Benchmarking Report, Financial Year 2015 / UEFA report

37. Deloitte. Rising Stars: Football Money League, January 2018

38. Deloitte. Eye on the prize: Football Money League, January 2020

7. List of pictures, tables, graphs and abbreviations

7.1. List of pictures

1. Five-number summary of variable "age" for attacking players. *Source: own analysis in econometric package STATA*
2. Five-number summary of variable "height" for attacking players. *Source: own analysis in econometric package STATA*
3. Five-number summary of variable "dribbling" for attacking players. *Source: own analysis in econometric package STATA*

7.2. List of tables

1. Attendances 21/22. *Source: transfermarkt.de*
2. Top 10 European clubs with the highest average game attendance. *Source: transfermarkt.de*
3. Football clubs net debt data. *Source: The European Club Footballing Landscape. Club Licensing Benchmarking Report, Financial Year 2015 / UEFA report*
4. European professional clubs' expenses for transfers. *Source: The European Club Footballing Landscape. Club Licensing Benchmarking Report, Financial Year 2015 / UEFA report*
5. Average data about defenders. *Source: own analysis in econometric package GRETL*
6. Average data about attacking players. *Source: own analysis in econometric package GRETL*
7. Attacking players' estimation. *Source: own analysis in econometric package GRETL*
8. Defending players' estimation. *Source: own analysis in econometric package GRETL*

7.3. List of graphs

1. Total income of professional clubs in Europe, billion euro. Source: Deloitte. Rising Stars: Football Money League, January 2018

2. Revenue growth of top 20 clubs (2013/14 – 2018/19), million euro. Source: Deloitte. Rising Stars: Football Money League, January 2018

7.4. List of abbreviations

1. UEFA: the Union of European Football Associations (Pages 21, 24-27, 43)
2. FIFA. French: Federation Internationale de Football Association (Pages 19, 40. 41, 47, 49)
3. FC. Football club (Page 14)
4. OLS. Ordinary Least Squares (method) (Pages 15, 17, 50, 54, 55)
5. LRM. Linear Regression model (Page 13)

Appendix

Appendix 1. Correlation table of variables included in defenders database

	Height	Age	Assist	Air Fight	Mins Played	Dribbling	Losses	Interception	Fouls	Yellow	Red	Offside	Clearance	Country Rating
Height	1.000													
Age	0.0732	1.000												
Assists	-0.1151	0.0094	1.000											
Air Fight	0.2705	0.1481	-0.0343	1.000										
Mins Played	0.0156	0.1142	0.0264	0.1230	1.000									
Dribbling	0.0391	0.0545	0.0101	0.1575	0.2539	1.000								
Losses	-0.1093	-0.1222	0.0659	-0.1299	-0.1011	0.0466	1.000							
Interception	0.0057	-0.0285	-0.0105	0.1481	0.0454	0.0713	-0.0472	1.000						
Fouls	-0.1396	-0.0126	0.0527	-0.0129	-0.0927	-0.0220	**-0.6628**	-0.0213	1.000					
Yellow	-0.0423	-0.0002	-0.0117	-0.0156	-0.0693	0.0270	0.0368	0.0680	**0.9651**	1.000				
Red	-0.0211	-0.0724	-0.0433	-0.0517	-0.0697	0.0312	0.0109	-0.0314	0.1024	-0.0274	1.000			
Offside	0.0573	-0.0219	0.0168	0.0018	-0.0605	0.0353	0.0153	-0.1048	**0.7049**	**-0.6188**	-0.0116	1.000		
Clearance	0.1621	-0.0305	-0.1071	0.00230	-0.0141	**-0.6465**	-0.1960	0.0396	-0.1598	-0.0468	-0.0119	-0.0550	1.000	
Country Rating	0.0575	-0.0007	-0.0508	0.1045	-0.0020	-0.0160	-0.0036	0.0301	-0.0295	-0.0625	-0.0251	-0.0219	0.0159	1.000

Source: own analysis using the statistical package STATA

Appendix 2. Correlation table of variables included in attacking players database

	Height	Weight	Age	Goals	Assists	Key passes	Goals to shots	Air Fight	Mins played	Dribbling	Disposition	Country rating
Height	1.0000											
Weight	**0.7172**	1.0000										
Age	0.0368	0.1317	1.0000									
Goals	0.0419	0.0450	0.0288	1.0000								
Assists	- 0.0388	- 0.0527	- 0.0133	0.1824	1.0000							
Key passes	- 0.1504	- 0.0919	- 0.0191	0.0960	0.3294	1.0000						
Goals to shots	- 0.0101	- 0.0168	0.0380	**0.8557**	0.1361	0.0674	1.0000					
Air Fight	0.2655	0.2276	0.1789	0.0092	0.0517	- 0.0424	0.0260	1.0000				
Mins played	- 0.0076	- 0.0125	0.1510	0.2086	0.2684	0.1000	0.2377	0.3394	1.0000			
Dribbling	- 0.0562	- 0.0982	0.0069	- 0.0118	0.0798	0.0741	0.0072	0.2404	0.3000	1.0000		
Dispostition	- 0.0854	- 0.0546	- 0.1032	0.1269	0.0552	0.2005	0.1059	- 0.1322	- 0.0329	0.0476	1.0000	
Country rating	0.0475	0.0220	- 0.0184	0.0080	- 0.0437	- 0.0444	0.0090	0.0437	0.0374	- 0.0178	0.0650	1.0000

Source: own analysis using the statistical package STATA

Appendix 3. Descriptive statistics of variables included in defending players database

Variable	Tvalue in Thousands	Height	Age	Assist	Air_Fight	Mins_Played	Dribbling
Mean	3060.000	183.000	27.000	0.046	0.587	666.000	0.555
Median	1880.000	183.000	27.000	0.000	0.588	694.000	0.583
S.D.	3580.000	5.920	3.910	0.102	0.161	340.000	0.348
Min	75.000	162.000	18.000	0.000	0.167	5.000	0.000
Max	18800.000	199.000	39.000	0.909	1.000	1350.000	1.000

Variable	Losses	Interceptions	Fouls	Yellow	Red	Offside	Clearance	Country_Rating
Mean	0.544	2.360	0.994	0.191	0.012	0.076	3.140	18.700
Median	0.382	2.360	0.856	0.155	0.000	0.000	2.840	14.000
S.D.	0.574	0.915	0.680	0.192	0.062	0.169	1.930	18.200
Min	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Max	3.940	5.000	3.990	1.000	1.320	1.860	11.400	100.000

Source: own analysis using the statistical package GRETL

Appendix 4. Descriptive statistics of variables included in attacking players database

Variable	Mean	S.D	Min	Max
Height	179.496	11.632	0.000	203.000
Weight	73.786	8.129	0.000	96.000
Age	25.744	4.146	17.000	40.000
Goal	0.193	0.386	0.000	7.500
Assist	0.114	0.214	0.000	3.000
Keypass	1.287	1.617	0.000	30.000
Goals to Shots	0.080	0.134	0.000	1.379
Air Fight	0.367	0.242	0.000	1.000
Mins Played	481.145	368.654	1.000	1350.000
Dribbling	0.457	0.304	0.000	1.000
Disposition	1.670	2.002	0.000	45.000
Country	21.662	23.735	1.000	179.000
Tvalue in thousands	5025.288	7916.810	38.000	75000.000

Source: own analysis using the statistical package STATA