

# Which Factors Decide the Market Value of Soccer Players: An Empirical Evidence from European League

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**Abstract:** The transfer market is an important for modern professional soccer, because it is one of the efficient systems to measure market value of players. Therefore, the invention of a reliable method of forecasting market value carries great significance and needs to be understood well. This paper analyzes how different factors (including age, height, weight, etc.) influences market value of soccer players, and comes up with models to understand casual. Two models are considered, one with dummy variable of position and one without.

## 1. Introduction

Soccer is one of the most popular sports in the world. As a sport with nearly 200 years of history, soccer has already attracted many amateurs. According to the official website of FIFA, a combined 3.572 billion fans tuned in to the 2018 World Cup Final. AS [ <https://as.com/>] news reports, in the 2015/2016 season, 1.2 billion fans globally watched La Liga games on TV. The high popularity of the sport attributes to a great extent to the influential soccer players. A news reports [ <http://dy.163.com/v2/article/detail/DUGSR1KG0529TPTB.html>] that since world-famous soccer player Cristiano Ronaldo joined Juventus, the team won 10 games in a row at the beginning of the season, which is the team's best record in 88 years. Team's performance helps players to increase their exposure rate. Serie A official account on Youtube received 187% increase in amounts of subscribe, and 137% increase in amounts of hit. Besides, the club gained huge profits as well. The players' market value is then affected by these phenomena. Therefore, analyzing key factors that affect players' market value by using scientific methods is significant.

The player's transfer is an essential part of soccer clubs. Players' transfer can boost soccer clubs to both form a dream team and attract global attention. Modern soccer clubs are really care about their profits. Influential players can not only assist a team win games, but also earn profits. Fans are willing to buy jersey. According to Tuttosport, Juventus sold more jerseys in one month than the team did throughout the previous season thanks to Ronaldo's transfer. In addition, advertisements on players' jerseys is another important way for clubs to earn money. If team's performance is good, the game is going out live. Many companies think advertisement on jersey is a good for marketing their brands. According to Daily Post, Premier League clubs earn 6.25 hundred million pound from jersey sponsors. From a player point of view, the transfer market allows themselves to be known by more people and evaluate their market value fairly. For most players who rely solely on soccer to maintain their living, it is important that their potentials to be reasonably utilized.

The goal of paper is identifying the key factors that affect the market value of soccer players in European leagues. In this paper, we take into account player's basic information and previous performance such as goals and playing time influence his market value.

## 2. Literature Review

This paper contributes to the existing literature about soccer. Egon Peter Franck, and Stephan Nuesch (2010) focus on the effect of talent disparity on team productivity in soccer. Fiona

Carmichael, David Forrest and Robert Simmons (1999) and Eberhard Feess and Gerd Muehlheusser (2003) focus on the transfer fees of the players. Benno Torgler and Sascha L. Schmidt (2007) prove that both absolute income level and relative income position affect soccer players' performance. Those papers have various topics, and are different than the purpose of this paper.

There are also a number of other studies that focus on the players' market value. Lehmann (2000), Christian Deutscher and Arne Büschemann (2014), Bernd Frick (2006), Bernd Frick (2007), Christer Thrane (2019), Pedro Garcia-del-Barrio and Francesc Pujol (2006), Dennis Coates, Bernd Frick and Todd Jewell (2016), Barry Reilly and Robert Witt (2017) and Alex Bryson, Bernd Frick, and Rob Simmons (2013) analyzes how factors such as age, position, footedness, race, economic contribution and number of assists affect players' salary or market value, using data from different leagues. This paper is an expansion to the papers mentioned above. This paper has similar objective as the previous papers, and the difference lies in selection of independent variables.

### 3. Model

In this section, I introduce the models that used to analyze the key factors of market value. First of all, we consider the following model:

$$mv = \beta_1 \times age + \beta_2 \times card + \beta_3 \times injury + \beta_4 \times gpg + \beta_5 \times gp + \beta_6 \times height1 + \mu \quad (1)$$

in which mv stands for market value of player, card stands for total of red and yellow cards that the player received in 18-19 season, injury stands for number of injuries of the player in 18-19 season, gpg stands for player's goal per game in 18-19 season, gp stands for the player's number of games played in 18-19 season, height1 stands for the height of the player in meters.  $\mu$  is the disturbance that are not considered in this model.

Second, we consider a model with an extra dummy variable "attack". In the model, attack=1 for attacking positions (wingers, forwards, attacking midfielders and strikers) and attack=0 for other positions (defensive midfielders, goalkeepers, backs).

$$mv = \beta_1 \times gpg + \beta_2 \times gp + \beta_3 \times attack + \mu \quad (2)$$

Age is an important factor for a player's market value. Professional soccer career is relatively short because of the injury. In most cases, as soccer players get older, they don't perform as well as the youngsters. The physical function decreases with age increases. They will suffer from more injuries in the career, which means they won't play as much time as before. Even they can play on the court, the performance will be influenced. Hence, we believe that older players are less valuable in the market than the younger ones.

According to the Laws of the Game published by FIFA [[https://www.fifa.com/mm/Document/FootballDevelopment/Refereeing/02/36/01/11/LawsofthegamewebEN\\_Neutral.pdf](https://www.fifa.com/mm/Document/FootballDevelopment/Refereeing/02/36/01/11/LawsofthegamewebEN_Neutral.pdf)], "The yellow card is used to communicate that a player, substitute or substituted player has been cautioned" and "the red card is used to communicate that a player, substitute or substituted player has been sent off." Cards can affect players' time on the court. They have less opportunity to demonstrate their full potential. More importantly, breaking rules and receiving cards can have negative impact on soccer fans' perception on the player, which will influence the player's contribution to the team and therefore market value.

Injury is considered in the model because it directly determines how much time a player can play on the soccer court. Injured player cannot attend matches or trainings, which is a huge loss for the team. Moreover, injury definitely affect players' market value due to uncertainties. Clubs may worry about sustained injury of players.

Goal per game and games played are indicators of a player's contribution to the team. Players who play more games in a season and score more goals prove their abilities to the coaches and audiences. Therefore, these players' market value is relatively high. Christian Deutscher and Arne

Büschemann (2014) discuss the similar setting in the paper that players' performances can be measured by these two variables and they affect players' salaries.

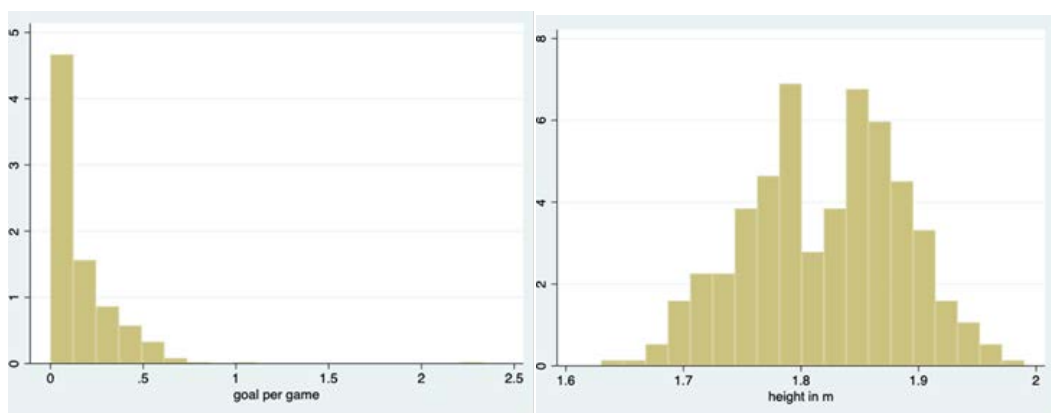
Height may also influence player's performance. Higher players tend to have advantages such as when blocking a free kick or making a header, but height may also make player move slower.

Position has a significant influence on market value. Strikers are one of the key positions in teams. Many superstars are famous due to they get many goals. The market value for different position may different. To capture this difference, a dummy variable (attack) is set to be considered to reflect this influence.

Some researches include footedness into the model. This variable is excluded from my model. The reason for that is players with left foot as preference foot have similar average market value as those whose right foot is the preference foot based on my data. It indicates that there is no evidence to show footedness is a determining factor for market value.

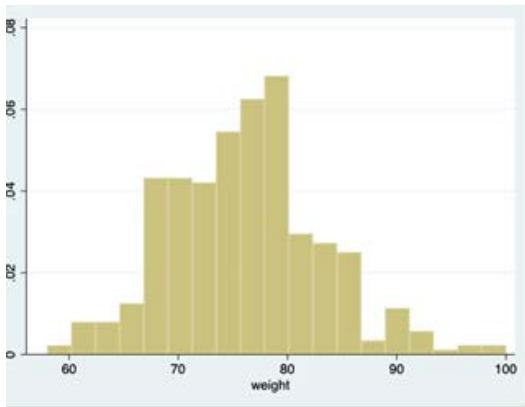
#### 4. Data

The data collected includes market values of the players and their basic information and performance in 18-19 season. Data about players can be divided into three categories. First category is basic information about players, which includes weight, height, age, position, nationality, and preference foot. Second category describes the player's performance in 2018-2019 season, which includes league he played, total number of games played, number of goal, yellow / red cards and injury. The first two categories are from multiple sources including Premier League official website [<https://www.premierleague.com/en-gb/players/profile.overview.html/sadio-mane>], Yahoo sport [<https://sports.yahoo.com/soccer/>], player profile page of soccer club official website [<https://www.realmadrid.com/en/football/squad/>], and FIFA World Cup UAE List of Players [[https://www.fifadata.com/documents/FCWC/2017/pdf/FCWC\\_2017\\_Squadlists.pdf](https://www.fifadata.com/documents/FCWC/2017/pdf/FCWC_2017_Squadlists.pdf)]. The last category is the market value of the player. The market values are collected from the transfermarkt, a German-based website which is world-famous for its complete and detailed information about soccer players. I report summary statistics of variables in Table 1. Distribution of dependent and independent variables across all players can be seen in the Figure 1-9. As shown in figures, variables such as height and age are more concentrated. The market value is left skewness. It is because super star soccer players are rare in my dataset. The distribution of goal is left skewness. Most players do not have goals in the season. Injury data shows interesting story. Many players get injury more than once. Many of them get injury at least 3-4 times in one season.

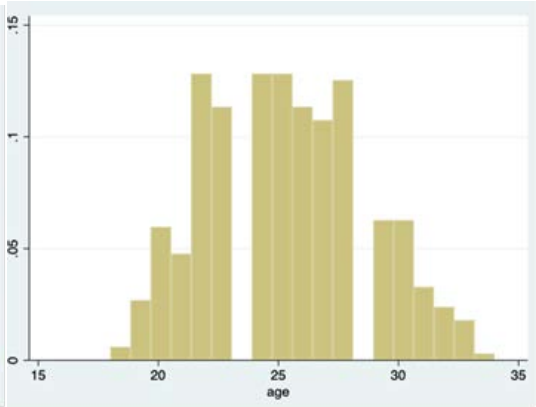


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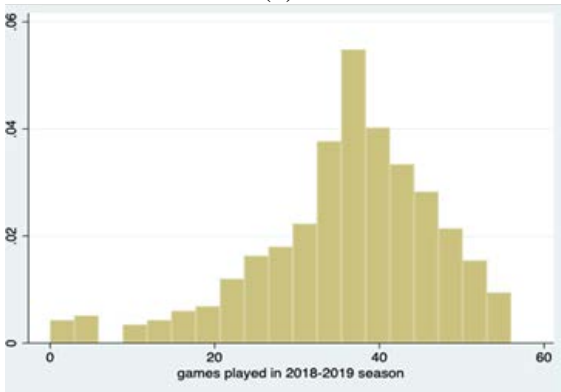
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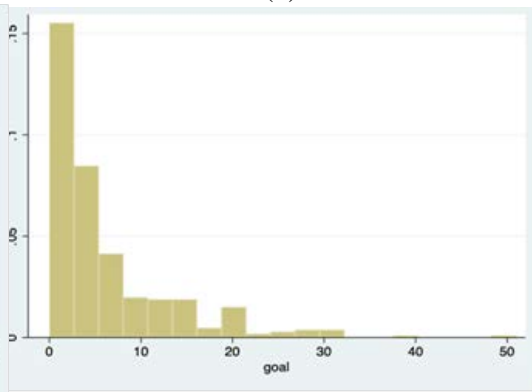
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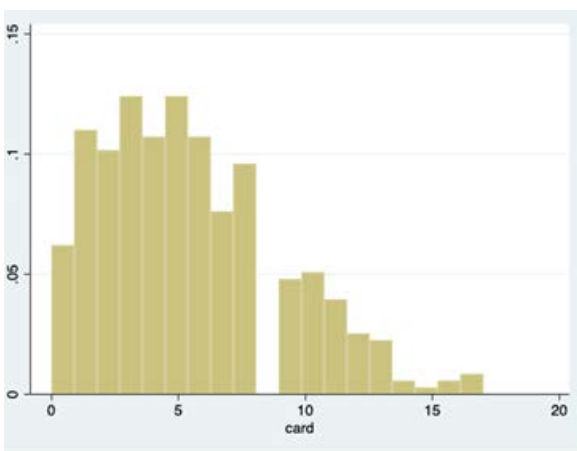
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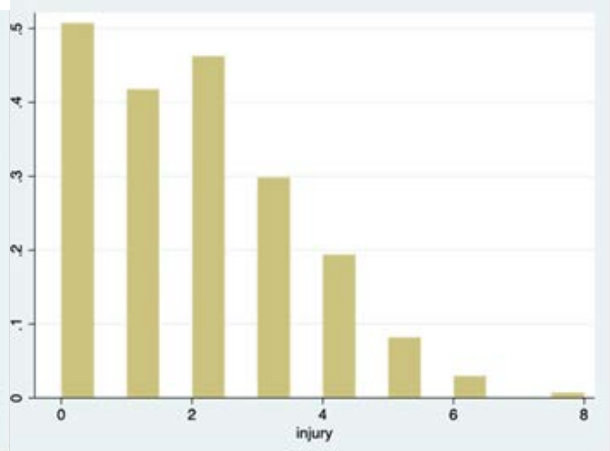
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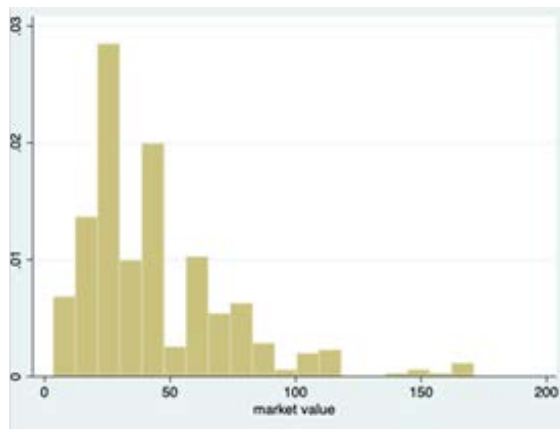
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(7)



(8)



(9)

Figure 1-9. Histograms of Variables

Table 1. Distribution of dependent and independent variables across all players

	Obs	Mean	Std. Dev.	Min	Max	
<b>Market Value (million dollar)</b>	398	43.404	29.664	3.42	171	
<b>Height (meter)</b>	398	1.821	0.649	1.63	1.99	
<b>Weight (kilogram)</b>	398	76.107	6.9778	58	100	
<b>Age (year)</b>	398	25.312	3.333	18	34	
<b>gp</b>	396	36.015	11.026	0	56	
<b>goal</b>	396	5.970	7.235	0	51	
<b>card</b>	396	5.376	3.636	0	17	
<b>injury</b>	268	1.832	1.576	0	8	
<b>gpg</b>	396	0.161	0.201	0	2.333	

Base on Table 1, we can see that market values spread widely, from 3.42 to 171 million dollar. Players with highest market values include Messi, Harry Kane and Eden Hazard. Players with lowest market values include Jorge Pulido, Marc Muniesa, and Stole Dimitrievski. Besides, 69% players' market value is between 3 to 50 million dollar, and only 1% players have market value greater than 150 million dollar. The player with greatest gpg is Thiago from FC Bayern Munich. Players who injured more than or equal to six times in one season are Naby Keita, Stefan Savic, Anthony Martial, Alexis Sánchez, and Mateo Kovacic. It is also worth noticing that because not all data are complete for each player. The number of observations I use in regression are presented in the result section.

Table 2. Summary of market value about players based on different positions

	Mean	Std. Dev.	Freq.	Proportion
W	55.20	41.00	68	17%
F	48.08	30.92	56	14%
AM	51.54	39.89	19	5%
ST	49.97	32.11	6	2%
CM, M	38.50	24.15	78	20%
DM	42.32	19.59	32	8%
GK	41.45	31.22	25	6%
B	36.46	21.13	114	28%
total	43.40	29.66	398	100%

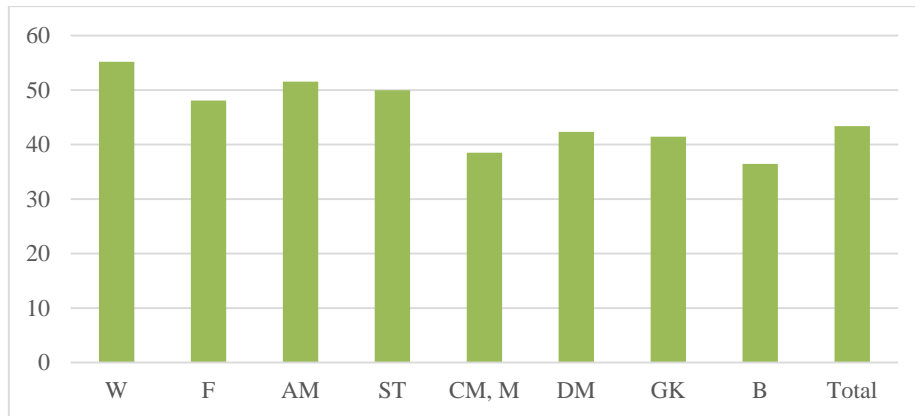


Figure 10. mean market value across positions

All players are divided into five categories according to their position. “W” stands for winger, “F” stands for forward, “AM” stands for attacking midfielder, “CM” stands for central midfielder, “DM” stands for defensive midfielder, “ST” stands for striker, “B” stands for back, “M” stands for midfielder, and “GK” stands for goalkeeper. By calculating the mean of market values of each group we can see that attacking positions (wingers, forwards, attacking midfielders and strikers) have the highest market values. Their market values also have higher standard deviations than average, which means that the distribution of those players is more dispersed.

Table 3. Basic information about players’ market value in different leagues

League	Mean	Std. Dev.	Freq.	Proportion
Other	13.09	14.13	25	6%
Big five	43.71	29.28	370	94%
total	43.65	29.63	395	100%

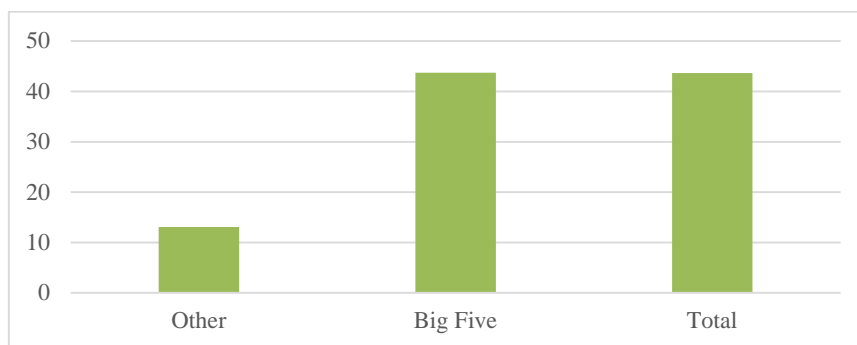


Figure 11. mean market value v. leagues

Average market value of players in the European big five football leagues are calculated and compared with that of other players. Table 3 shows that players in higher rank leagues have higher market values.

Table 4. Basic information about players with different preference foot

Preference foot	Mean	Std. Dev.	Freq.	Proportion
Both	55.83	37.19	33	9%
Right	43.01	27.72	243	65%
Left	43.57	31.45	100	26%
total	44.28	29.80	376	100%

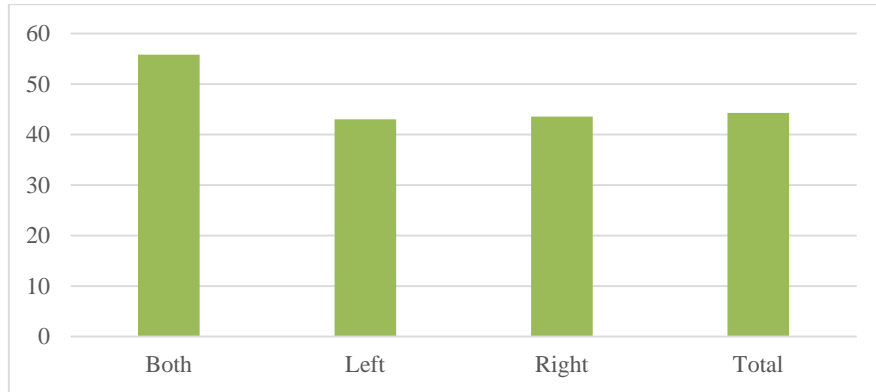


Figure 12. mean market value v. preference foot

It is notable from Table 4 and Figure 12 that for players who reported their preference foot, those who are good at using both feet have higher market values than their counterparts, while players with either left or right preference foot have approximately equal market value.

## 5. Result

In this section, the regression results are reported in Table 5 and Table 6.

The first model is:

$$mv = -1.35 \times \text{age} - 1.74 \times \text{card} + 2.32 \times \text{injury} + 45.32 \times \text{gpg} + 1.55 \times \text{gp} - 8.32 \times \text{height1} + 37.65$$

The second model is:

$$mv = 39.53 \times \text{gpg} + 1.097 \times \text{gp} + 1.575 \times \text{attack} + 22.07$$

Table 5. Ordinary Least Squares (OLS) Results for Model 1

Dependent Variable: market value	
Independent Variable	OLS
age	-1.345*** (0.490)
card	-1.745*** (0.450)
injury	2.319** (0.993)
gpg	45.32*** (7.171)
gp	1.555*** (0.150)
height1	-8.307 (24.30)
constant	37.65 (46.27)

\* p<.5; \*\* p<.1; \*\*\* p<.05; standard errors in parentheses.

Number of observations for this regression is 268, and R-squared is 0.3936. According to Table 5, only height is not statistically significant, the rest of variables all affect the market value of players. For every additional year to the player's age, his market value decreases 1.345 million dollar. For every additional yellow or red card received by the player, his market value decreases 1.745 million dollar. For every additional injury, market value increases 2.319 million dollar. For every additional goal per game, market value increases 45.32 million dollar. For every additional game played, market value increases 1.555 million dollar. For every additional meter in height, market value decreases 8.307 million dollar. Height is not statistically significant.

Table 6. Ordinary Least Squares (OLS) Results for Model 2

Dependent Variable: market value	
Independent Variable	OLS
gpg	39.53*** (7.707)
gp	1.097*** (0.117)
height1	-13.70 (20.47)
attack	1.575 (43.303)
constant	22.07 (37.72)

\*  $p < .5$ ; \*\*  $p < .1$ ; \*\*\*  $p < .05$ ; standard errors in parentheses

Number of observations for this regression is 396, and R-squared is 0.2700. According to Table 6, in Model 2, holding other factors (goal per game, games played and height) fixed, market value of player in attacking position is 1.575 million dollar higher than that of the others. It is notable that goal per game, numbers of game played and height result in a difference of market value of attacking players and defensive players, while other variables (age, card, and injury) influence attacking and defensive players in similar ways.

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