



Ann Appl Sport Sci 13(1): e1574, 2025.

e-ISSN: 2322-4479; p-ISSN: 2476-4981

**ORIGINAL ARTICLE**

Factors Associated with the Market Value of Forward Soccer Players

¹José Carlos Rivera , ²Josefina C. Santana , ¹André Burgueño , ¹Hugo Briseño ¹Facultad de Ciencias Económicas y Empresariales, Universidad Panamericana, Guadalajara, Mexico.²Escuela de Comunicación, Universidad Panamericana, Guadalajara, Mexico.*. Corresponding Author: Josefina C. Santana; E-mail: jsantana@up.edu.mxSubmitted March 17, 2025;
Accepted May 25, 2025.**KEYWORDS***Ordered Logit,
Soccer,
Player Value,
Transfermarkt,
Valuation.***ABSTRACT**

Background. Football is an important contributor to local economies. **Objectives.** This research explores the variables associated with the value of forward soccer players. **Methods.** The Transfermarkt.de page generated a database with 500 soccer forwards with a market value of less than 40 million euros and who scored at least one goal. The players' values were divided into ranges from 1 to 5, and an ordered logit model was carried out. **Results.** A significant positive relationship was found between the forwards' value range and playing in Europe, the logs of the goals, and the number of Instagram followers. A significant negative relationship was found between the value range and the logarithms of age and the number of minutes to score a goal. The model yields a correctly predicted percentage of 35.4%. **Conclusion.** The study offers an accurate tool to analyze and predict player market value, emphasizing player position.

INTRODUCTION

Football, the dominant sport worldwide, contributes significantly to the global economy (1-3), and the financial aspects of football have been the focus of much academic study. Success significantly impacts a team's popularity and marketability; therefore, clubs invest heavily in players who improve performance and attract fans (3, 4).

Changes in rulings, such as the 1995 Bosman initiative, have facilitated player mobility, especially toward the European market (5-7). Because players are a key asset for clubs (5, 6), player valuation, transfer fees, and contract negotiations are important drivers of the sports economy (8).

A study of players from the top five European leagues concluded that team level, month of birth, league, position, and age significantly influence the footballer's market value. Participation in the UEFA Champions League and Premier League teams and an attacking midfielder position positively relate to market value (9).

Using quantitative methods such as hedonic regression and Bayesian model averaging (BMA), Serna Rodríguez et al. (2019) concluded that the most important factors related to footballer value are the player's performance, being on the national team, and age (6). Other studies have highlighted the market value of a player's popularity, with one finding that

popularity had a greater impact than performance on a player's wages (10) and another (11) confirming the role of popularity in determining market value.

Determining a player's market value is important for several reasons. Firstly, understanding the factors contributing to a player's market value, such as goals scored, assists, team value, and even the "goodwill" associated with a player's brand, can help football managers make informed investment decisions (12). Secondly, by analyzing the relationship between player performance metrics and their market value, analysts and researchers can gain insights into the overall market dynamics of the sport (13). This understanding can help identify undervalued players, predict future transfer fees, and analyze trends in player valuations (14). Finally, players and their agents can use the information in contract negotiations (5).

This study used data from the Transfermarkt webpage (15) and an ordered logit model to analyze 500 football forwards. It contributes to the literature by emphasizing the role of player positions and using a novel data analysis method. Additionally, it incorporates the role of player popularity as a variable, as operationalized by followers on Instagram.

Economic theories suggest that the value of a good depends on objective and subjective aspects, such as buyers' perception and the supply/demand relationship, the time factor, and location. These aspects of value are summarised in Table 1.

In the context of forward soccer players, we can relate the objective element to their performance measurements, including goals and assists, or subjective elements, such as player popularity. Regarding the time element, we use age to estimate the remaining years of the professional career, and, as a location element, participation in a prestigious league, as in some European leagues.

Transfermarkt is a crowd-sourced German website that publishes market value data on football players. According to the website, Transfermarkt uses community wisdom to establish predictions on a player's market value. This is possible because valuation is not an objective measure but rather a "social process" (16) that determines what elements are or are not relevant in determining the value of something. The Transfermarkt community includes professionals involved in sports, but is mainly

comprised of interested laypeople. The elements considered for valuation include player age, prospects, performance, league, reputation, potential, and others (17). Popularity is not included as a factor.

Sports managers and researchers have found Transfermarkt quite accurate (18-21). Pieper and Schulze (2024) found that players' values are built through constant interaction between users who propose values and the experts who justify said values. The authors concluded that a footballer's value is relative to other players and real transactions in the transfer market (22).

In other studies, Herm et al. (2014) used an econometric model to analyze the accuracy of fan community estimates on the Transfermarkt website. They concluded that the community's estimates could predict transfer prices and that two main groups of factors are associated with value: those directly related to the players' talent and those related to perceptions of external actors (18). Müller et al. (2017) used multilevel regression on data from five European leagues. They found a strong correlation between crowd-sourced valuations and actual transfer fees (23). However, Transfermarkt data have limitations, as they frequently depend on public opinion or trends (24, 25).

Researchers have examined the impact of individual player skills on market valuation. Using principal component analysis, cluster analysis, and multilevel regression, they found that club reputation also significantly impacts market value (19).

Velema studied upward and downward mobility in players in the European leagues and found that mobility and performance indicators can predict player market value (26).

For female soccer players, some indicators of their performance and popularity on social networks are related to their market value. Their physical attractiveness has no direct relationship to market value, although it is indirectly related by affecting their popularity on social networks (22).

The literature search uncovered no research focusing specifically on players in the forward position. Furthermore, none of the studies used the number of Instagram followers as an independent variable. Additionally, none of the analyzed research employs the ordered logit model. This study contributes to the existing literature by emphasizing the role of player

positions, incorporating the analysis of the Instagram followers' variable, utilizing a novel methodology for processing the data, and using the analysis framework proposed in Table 1 of this document.

MATERIALS AND METHODS

During the first days of August 2024, data were extracted from the Transfermarkt website to analyze the factors associated with the value of the 500 most valuable forwards globally. The tool for extracting the information from Transfermarkt was Web Scraper, an extension for browser use developed by webscraper.io (<https://webscraper.io/>). It is a no-code tool that allows users to extract structured data from websites.

A sitemap was created from the Transfermarkt webpage (<https://www.transfermarkt.com>). The configuration started with text, which was the names and nationalities of the players. Then, the link element was used to access the players' specific information. The text element extracted their goals, passes, and minutes per game. The pagination element was used to repeat the process

for all players and the webpage subpages. Finally, after scraping the information from the site, we asked the extension to paste it into an XLSX file.

Gretl was the tool used for analysis. The ordered logit model was selected as it is well-suited to identifying the factors associated with an ordered value range—in this case, the player's value levels are categorized from 1 to 5. This model is particularly well-suited for analyses where the dependent variable is categorical with an inherent order, such as the value ranges of football players, as examined in this study.

RESULTS

The variables extracted or constructed from this consultation are observed in Table 2. The variables can be classified according to Table 1. As objective elements of value, we find minutes for goals, goals, assists, and goals plus assists. As a subjective element of value, we find followers on Instagram as a proxy variable for player popularity. As a time element, we find the footballer's age, and as a location element, we find the footballer playing in European leagues.

Table 1. General elements of value.

Objective element	Subjective Element	Time	Location
Characteristics of the good or its performance	Perception	Measure how the time dimension impacts the value	Benefits or problems that affect the location where the asset is located

Table 2. Variables, description, and descriptive statistics (n=500).

Variable	Description	Average	St.Dev.	Min.	Max.
Market value (VALUE)	Market value in millions of euros	22.24	22.92	7.00	180.00
Value range (VALUE_R)	Market value in ranges: 1 (from 7 to 22); 2 (from 22.1 to 45); range 3 (from 45.1 to 65); range 4 (from 65.1 to 90); and range 5 (from 90.1 to 180)	1.45	0.85	1.00	5.00
EUROPE	Play in Europe = 1 Otherwise = 0	0.86	0.34	0.00	1.00
AGE	Player age	24.79	3.66	16.00	39.00
Minutes per goal (MPG)	Number of minutes for the player to score a goal	238.69	165.78	0.00	1,460.00
GOALS	Goals scored by the player	59.19	72.14	0.00	759.00
ASSISTS	Assists made by the player	29.62	32.93	0.00	273.00
Goals plus assists (G+A)	The sum of goals and assists	88.81	101.12	0.00	997.00
Instagram Followers (INSTA)	Number of followers on Instagram (millions)	5.43	38.63	0.00	635.00

Source: authors with information from Transfermarkt.

Table 2 shows that the average market value of the 500 most valuable forwards in the world is 22.24 million euros, with a minimum of 7 and a maximum of 180. A high dispersion is observed with a standard deviation of 22.92. In other data, the average age is 24.79, the minutes to score a goal are 238.69, the goals are 59.19, the assists are 29.62, the sum of goals and assists is 88.81, and the followers on Instagram are 5.43 million.

With the data above, ordinary least squares models were made, which did not meet the statistical assumptions for this type of methodology. Thus, an ordered logit model was used to generate value ranges.

The data are very dispersed, with players having a higher value than the average. Of the 500 players studied, only 33 were placed in range 3, with nine in range 4, and only 10 in range 5.

Thus, it was considered advisable not to include players with very high values so that the data would not be so dispersed. Another database with players with a maximum value of 40 million euros was considered, giving 438 observations. That is, 62 players with very high values compared to the average were not considered. Table 3 shows the descriptive statistics of this new database.

Table 3 shows that the average market value in millions of euros of forwards in the database is 15.45, with a maximum of 40 and a minimum of 7. We observe a lower standard deviation about the mean and, therefore, less data dispersion.

In other data, 84% of players play in Europe. Their average age is 24.85. It takes them 237.5 minutes to score a goal; they have 55.14 goals, 27.23 assists, 82.37 goals plus assists, and 4.88 million followers on Instagram.

Table 3. Variables, description, and descriptive statistics (n=438).

Variable	Description	Average	St.Dev.	Min.	Max.
Market value (VALUE)	Market value in millions of euros	15.45	8.25	7.00	40.00
Value range (VALUE_R)	Market value in ranges: 1 (from 7 to 8); 2 (from 8.1 to 10); range 3 (from 10.1 to 14); range 4 (from 14.1 to 20); and range 5 (from 20.1 to 40)	3.03	1.43	1.00	5.00
EUROPE	Play in Europe = 1 Otherwise = 0	0.84	0.36	0.00	1.00
AGE	Player age	24.85	3.74	16.00	39.00
Minutes per goal (MPG)	Number of minutes for the player to score a goal	237.5	172.33	0.00	1,460.00
GOALS	Goals scored by the player	55.14	71.65	0.00	759.00
ASSISTS	Assists made by the player	27.23	32.68	0.00	273.00
Goals plus assists (G+A)	The sum of goals and assists	82.37	100.64	0.00	997.00
Instagram Followers (INSTA)	Number of followers on Instagram (millions)	4.88	40.69	0.00	635.00

Source: authors with information from Transfermarkt.

The model used is an ordered logit because it allows us to find the factors associated with an ordered value range (in this case, the player's value levels from 1 to 5). As shown in Table 4, range 1 goes from 7 to 8 million euros; range 2 goes from 8.1 to 10 million euros; range 3 goes from 10.1 to 14 million euros; range 4 goes from 14.1 to 20 million euros; and range 5 goes from 20.1 to 40 million euros.

Table 4 shows the model with the best fit, using the dependent variables AGE, MPG,

GOALS, and INSTA in logarithmic functional form.

The EUROPE variable is positive and significant at 1 percent, meaning players who play on this continent are perceived as more valuable because of the leagues in which they compete.

The logarithm of AGE is negative and significant at the 1 percent level; older players could see their market value affected by a potentially shorter remaining life of their football career.

The logarithm of minutes per goal (MPG) was significant and negative at 1 percent, indicating that greater time to score a goal can negatively affect the value of forwards.

The GOALS variable in logarithmic form is significant and positive in the value range at the 1 percent level, meaning that more goals positively impact a forward's market value.

The logarithm of Instagram followers (INSTA) is significant and positive at the 1

percent level because greater popularity on the social network impacts market value.

Pseudo R-squared is 0.1016. However, a better measure of goodness of fit for logit models is the percentage correctly predicted, which in this case is 35.4%. This means that the probability of the model choosing the correct category out of the five orders is 35.4% when, based on chance, it would be only 20%. We can say that the model gives us 15.4% more certainty than simple chance.

Table 4. Ordered logit model to estimate value range (VALUE_R).

VALUE_R	Coefficient	Standard error	Z	p-value
EUROPE	1.816356	0.312781	5.81	0.000
L_AGE	-2.702354	0.7765515	-3.48	0.001
L_MPG	-0.532795	0.1756308	-3.03	0.002
L_GOALS	0.4369668	0.087561	4.99	0.000
L_INSTA	0.3209745	0.056994	5.63	0.000
Observations (n)	384			
Percentage Correctly Predicted (PCP)	35.4%			

DISCUSSION

The value of a forward soccer player is defined by factors such as goals scored, minutes per goal, playing in Europe, age, and followers on Instagram. These factors converge to give a value to the player. The significant variables are identified with the analysis framework proposed (Table 1) since the objective elements of the value are the goals and minutes scored; the subjective element is followers on Instagram; the time element is age; and the location element is playing in Europe. These factors were analyzed to understand how they construct value.

Goals have a direct correlation: the more goals scored, the more effective the forwards are. Forward players with more goals are more valuable as their primary function is to score. Our findings align with previous studies (5, 6). The demand for these players increases, offering them higher transfer fees and salaries. Likewise, minutes per goal impact player value. This refers to how long the forward takes to score a goal during their field time; a lower rate of minutes per goal ratio makes a forward a better option for teams.

Other studies have also shown that playing in Europe adds to a player's value (3) because European leagues provide greater visibility to footballers, increasing their value to recruiters. Our research shows that age can predict a player's market value, consistent with other studies (5, 6).

Finally, our study shows that Instagram followers add value to a player. Having followers creates a personal brand for players; soccer clubs look for players with massive followers on Instagram because they can contribute to sponsorships and additional revenue streams through merchandising and marketing channels. A higher number of followers means higher global popularity, which can help a club attract fans worldwide. This is an exciting finding because it had not been explored in male players in previous studies, though similar findings are evident among women players (22). It is worth further exploration in future research.

These factors interact with each other to give the player their value; a younger player with a low ratio of minutes per goal, a high number of goals scored, and significant Instagram followers playing in a top European league would likely have a high-priced market value.

Regarding the model's predictive value (35.4%), we found no studies in indexed journals that use the ordered logit model to predict a range of market values for soccer players. They generally use other goodness-of-fit measures that are not comparable to the percentage correctly predicted. This indicator tells us the percentage of times the model is correct, in this case, assuming the outcome could be five ordered options. If the outcome were random, the probability of being correct would be 1/5, or 20%. In this case, the model gives us a probability of

35.4%, allowing us greater precision than randomness. The modest predictive value is one of the study's limitations. However, it highlights the complex and multidimensional nature of player valuation, which involves numerous intangible and unobservable factors, as noted by previous researchers (5, 6).

Likewise, concentrating on forwards from the European leagues limits the study's generalizability. Further research should include players from other leagues and other positions. The role of social media presence on player value should be further expanded, including the goodwill generated or lost through player posts related to controversial topics.

CONCLUSION

The article presents a valuable contribution to sports management literature, focusing on a specific and under-researched player position and leveraging innovative variables and a robust theoretical framework. Using an ordered logit model, a significant positive relationship was found between the value range of the forwards and playing in Europe, the logs of the goals, and the number of Instagram followers. Similarly, a significant negative relationship was found between the value range and the logarithms of age and the number of minutes to score a goal. The model yields a correctly predicted percentage of 35.4%. The study offers an accurate tool to analyze and predict player market value, emphasizing player position. It includes the variable of player popularity operationalized as followers on Instagram, which is a novel contribution we show to be significant and positive.

APPLICABLE REMARKS

- The findings highlight the interplay between performance metrics and perception-driven variables (e.g., Instagram followers), supporting theories that suggest value is not solely determined by performance but also by perceived popularity.
- Clubs can use the findings to identify undervalued forwards by focusing on measurable performance indicators like goals

and minutes per goal while considering social media presence as a secondary factor for marketability.

- Players and their agents can consider the importance of brand building through social media.

AUTHORS' CONTRIBUTIONS

Study concept and design: José Carlos Rivera, Hugo Briseño. Acquisition of data: André Burgueño. Analysis and interpretation of data: José Carlos Rivera, Hugo Briseño, André Burgueño. Drafting the manuscript: Josefina C. Santana. Critical revision of the manuscript for important intellectual content: José Carlos Rivera, Josefina C. Santana, André Burgueño, Hugo Briseño. Statistical analysis: André Burgueño. Administrative, technical, and material support: Josefina C. Santana. Study supervision: Hugo Briseño

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest related to the publication of this article.

FINANCIAL DISCLOSURE

The authors have no financial relationships to disclose that are relevant to this article's content.

FUNDING/SUPPORT

This work was supported by Universidad Panamericana, a private university located in Mexico.

ETHICAL CONSIDERATION

The authors state that no ethical issues were involved in the conduct or reporting of this research.

ROLE OF THE SPONSOR

The sponsor, Universidad Panamericana, had no role in the manuscript's study design, data collection, analysis, interpretation, or writing.

ARTIFICIAL INTELLIGENCE (AI) USE

The authors wrote this article. Grammarly was used for proofreading and style editing.

REFERENCES

1. Inan T, Cavas L. Estimation of market values of football players through Artificial Neural Network: A model study from the Turkish Super League. *Appl Artif Intell.* 2021;35(13):1022–42. [doi:10.1080/08839514.2021.1966884]

2. Metelski A. Factors affecting the value of football players in the transfer market. *J Phys Educ Sport*. 2021;21(2).
3. Sánchez M, Orgaz B, Ramirez-Campillo R, Nakamura FY, Luis-Pereira JM, Carretero M, et al. Factors associated with the market value of professional soccer players. *Cuad Psicol Deporte*. 2022;22(3):140–50. [doi:10.6018/cpd.457441]
4. Pifer ND, Wang Y, Scremin G, Pitts BG, Zhang JJ. Contemporary global football industry: An introduction. *The global football industry*. 2018 Jan 29;3-5. [doi:10.4324/9781351117982-1]
5. Franceschi M, Brocard J, Follert F, Gougnet J. Determinants of football players' valuation: A systematic review. *J Econ Surv*. 2024;38(3):577–600. [doi:10.1111/joes.12552]
6. Serna Rodríguez M, Ramírez Hassan A, Coad A. Uncovering value drivers of high-performance soccer players. *J Sports Econ*. 2019;20(6):819–49. [doi:10.1177/1527002518808344]
7. Acheampong EY, Malek B. African footballers' life cycles according to the analysis of transfer value along their career path: a case study of Ghanaian players. *Sport Soc*. 2019;22(12):2024–44. [doi:10.1080/17430437.2018.1551366]
8. Hoey S, Peeters T, Principe F. The transfer system in European football: A pro-competitive no-poaching agreement? *Int J Ind Organ*. 2021 Mar;75:102695. [doi:10.1016/j.ijindorg.2020.102695]
9. Campa D. Exploring the Market of Soccer Player Registrations: An Empirical Analysis of the Difference Between Transfer Fees and Estimated Players' Inherent Value. *J Sports Econ*. 2022;23(4):379–406. [doi:10.1177/15270025211059527]
10. Carrieri V, Principe F, Raitano M. What makes you 'super-rich'? New evidence from an analysis of football players' wages. *Oxf Econ Pap*. 2018;70(4):950–73. [doi:10.1093/oep/gy025]
11. Singh P, Lamba PS. Influence of crowd-sourcing, popularity, and previous year statistics in market value estimation of football players. *J Discrete Math Sci Cryptogr*. 2019;22(2):113–26. [doi:10.1080/09720529.2019.1576333]
12. Majewski S. Identification of factors determining the market value of the most valuable football players. *J Manag Bus Adm Cent Eur*. 2016;24(3):91–104. [doi:10.7206/jmba.ce.2450-7814.177]
13. Serna Rodríguez, M. Factor analysis of the market value of high-performance players for three major European association football leagues. *Manag Sport Leis*. 2021;26(6):484–507. [doi:10.1080/23750472.2020.1771197]
14. Malagón-Selma P, Debón A, Domenech J. Measuring the popularity of football players with Google Trends. Follert F, editor. *Plos One*. 2023;18(8):e0289213. [doi:10.1371/journal.pone.0289213] [PMid:37585380]
15. Transfermarkt.de [Internet]. [cited 2024 November 2]. Available from: https://www.transfermarkt.com/spieler-statistik/wertvollstespieler/marktwertetop/mw/spielerposition/_id/3/2/9/2/20/.
16. Detzen D, Löhlein L. Valuing soccer players: on the valuation dynamics of an online user community. *Accounting, Auditing & Accountability Journal*. 2024;37(2):608-26. [doi:10.1108/AAAJ-05-2022-5824]
17. Transfermarkt.com [Internet]. 2021 [cited 2024 December 12]. Transfermarkt.com. Available from: https://www.transfermarkt.com/market-value-definition/thread/forum/357/thread_id/3433.
18. Herm S, Callsen-Bracker HM, Kreis H. When the crowd evaluates soccer players' market values: Accuracy and evaluation attributes of an online community. *Sport Manag Rev*. 2014;17(4):484–92. [doi:10.1016/j.smr.2013.12.006]
19. Kirschstein T, Liebscher S. Assessing the market values of soccer players – a robust analysis of data from German 1. and 2. Bundesliga. *J Appl Stat*. 2019;46(7):1336–49. [doi:10.1080/02664763.2018.1540689]
20. Krumer A, Lechner M. Midweek effect on soccer performance: Evidence from the German Bundesliga. *Econ Inq*. 2018;56(1):193–207. [doi:10.1111/ecin.12465]
21. Peeters T. Testing the Wisdom of Crowds in the field: Transfermarkt valuations and international soccer results. *Int J Forecast*. 2018;34(1):17–29. [doi:10.1016/j.ijforecast.2017.08.002]
22. Pieper M, Schulze GG. Performance and beauty in sports-on the market value and popularity of European female soccer players. *J Econ Behav Organ*. 2024;218:309–24. [doi:10.1016/j.jebo.2023.12.021]

23. Müller O, Simons A, Weinmann M. Beyond crowd judgments: Data-driven estimation of market value in association football. *Eur J Oper Res.* 2017;263(2):611–24. [[doi:10.1016/j.ejor.2017.05.005](https://doi.org/10.1016/j.ejor.2017.05.005)]
24. Leifheit N, Follert F. Financial player valuation from the club's perspective: the case of football. *Manag Sport Leis.* 2023;28(6):618–37. [[doi:10.1080/23750472.2021.1944821](https://doi.org/10.1080/23750472.2021.1944821)]
25. Coates D, Parshakov P. The wisdom of crowds and transfer market values. *Eur J Oper Res.* 2022;301(2):523–34. [[doi:10.1016/j.ejor.2021.10.046](https://doi.org/10.1016/j.ejor.2021.10.046)]
26. Velema TA. Upward and downward job mobility and player market values in contemporary European professional football. *Sport Manag Rev.* 2019;22(2):209–21. [[doi:10.1016/j.smr.2018.02.004](https://doi.org/10.1016/j.smr.2018.02.004)]