Analyzing the Performance of Soccer Attacking Players as They Approach the End of Their Contracts

Abstract

The aim of this study is to examine the impact of contracts on the performance of attacking soccer players. It investigates how financial and personal motivations influence on field performance. The sample consists of 136 observations (34 players and 4 years of data for each player) from major European Leagues (Premier League, Serie A, LaLiga, Bundesliga, Ligue 1) during the season 2017/18 to 2020/21. The dependent variable is performance which is a metric consisting of players in game statistics like goals, assists, shots, dribbles and passes. The main independent variable is contract time remaining, which measures how many years or season a player has on their contract followed by control variables age, minutes played and discipline (fouls committed). The model uses multiple linear regression that uses fixed effects which controls for individual characteristics that do not change over time (like player talent) by including entity (player) effects. The results from the main model showed that players perform better in their final years of the contract. The findings provide valuable insights for clubs, agents, and players in structuring contracts and making informed decisions on player retention. Understanding these performance trends can help clubs optimize contract lengths and incentives, ensuring sustained contributions from their players.

Introduction

In professional soccer, contracts play a vital role in shaping a player's career and performance. The basic definition of a contract is that it is an agreement between two parties that creates an obligation to perform or not perform a particular duty. In simple terms, it is a legally binding document to do something. There are slight changes between the contracts in general and football contracts as they have specific clauses and terms related to sports law specifically. The football contracts are meticulously detailed and have changed over time (Globalsportspolicy, 2022). Footballers' contracts typically have a specified duration, which can generally range from one to five years. However, they can be renewed or extended based on the agreement between the player and the club. (Sportsmanagement, 2024)

A key aspect of soccer contracts is the transfer windows that regulate when players can move between clubs, ensuring structured player transfers. Twice a year, FIFA regulations set out two annual periods during which clubs can buy in foreign players, known as transfer windows. The longer transfer window falls between seasons and the shorter one falls mid-season, but the exact timing is set by individual countries' football associations. In many European countries the summer transfer window closes on August 31. In the US it closed on August 9 (How Does a Football Transfer Work?, 2022b). A common feature in contracts is the release clause, a clause in the player's contract that becomes effective when the minimum selling figures set out in the player's employment contracts is triggered by the Purchasing Club (Globalsportspolicy, 2022). When a player's contract expires, they can either negotiate a renewal with their current club or leave as a free agent. Contract extensions require mutual agreement between both parties.

Additionally, loan deals allow players to temporarily join another club while still being under contract with their parent team, providing opportunities for development and game time.

This study examines the relationship between attacking players' performance and their contract status, focusing on whether their performance improves as they approach the end of their contracts. The decision to focus on the attacking players is based on their impact on the game which can easily be measured. Goals win the game and most of the goals are scored by the attacking players. Since goals are the deciding factor in matches, evaluating the performance of attacking players provides valuable insights into the effect of contract incentives on player behavior.

A player's performance can fluctuate due to various factors, including contract duration, team dynamics, and personal motivation. Specifically, players nearing the end of their contract may feel pressured to perform better to secure a renewal or attract interest from other clubs. The objective of this study is to assess whether attacking player's performances improve as they approach contract expiration, analyzing the role of incentives in shaping their on field behavior.

From an economic perspective, incentives significantly influence performance. The motivation to perform at a higher level when approaching the end of a contract can be explained through the incentive theory where players strive to secure a favorable contract extension or a transfer to a more competitive club. This study will examine the impact of contract timelines on on-field performance, as well as the economic consequences for clubs, agents, and players.

The main economic actors in professional soccer, such as players, coaches, player agents, fans and club decision-makers, have a significant influence on contracts and performances. As the player's contract period comes closer, the players are encouraged to play more and show off their skillset and passion in order to get a contract renewal or get other clubs attracted to them. However, in addition to the player's success on the field, the club considers other aspects such as the player's discipline, attitude, activities outside the field, media reactions, and, most importantly, financial aspect of the club. Lastly, the agent acts as middleman as they represent their player and do all the negotiations regarding the contract. In order to get the best possible deal, agents use their understanding of the market and player performance trends to shape contract outcomes. These actors work together to produce a dynamic environment that influences decisions by combining contract timelines, performance, and financial incentives.

The purpose of this study is to understand whether players nearing contract expiration affect their performance and how this impacts club decision-making. From a policy perspective, the insights from this analysis could inform contract structuring strategies for clubs and also the agents. Players approaching contract expiration tend to improve their performance in hopes of getting a renewal or getting interest from other clubs or raising their market value. Evidence supporting the concept of a "contract year", when a player's performances improve during the final year of an existing deal, is mixed. A study of 275 players who spent two consecutive seasons in Serie A between 2012 and 2014 – the dates before and after signing a contract – suggested players performed better in the final year of their agreements (Reporter, 2024). This can be related to economic theory of incentives where players have a financial and professional motivation to perform better to negotiate and get the best deal.

However, not all players show performance improvement. During this end of contract period, some players experience a decline in performance due to psychological pressure or uncertainty. This also includes potential injury concerns, which may negatively impact player performance. Additionally, the clubs also adjust their decision-making regarding contract renewals based on performance trends of players in their final contract years where they analyze past trends to make informed decisions regarding contract renewals and player retention.

Past studies have analyzed player statistics before and during contract years, showing performance change as they reach closer to the end of their contract. By analyzing player performance data, this research also aims to provide understanding of how contract influences attacking soccer players performance.

Literature Review

The previous research related on performance and contract renewal has shown that the players tend to change their playing pattern as the season goes by. Prior studies have examined this highlighting how contract status influences player behavior and performance level. These studies suggest that players may strategically adjust their efforts based on their contractual situation, with some increasing their performance in anticipation of a renewal or transfer, while others may experience a decline in motivation after securing a long-term deal.

An early study studied the change of player performance in the last year of contract. Frick (2011) has highlighted the difference, using two large longitudinal datasets from German professional

football, the paper demonstrates that first players are remunerated by the market according to their innate talent and their performance, with the most recent performance being far more important than the performance delivered years ago. Second, the paper finds clear evidence of increasing player effort over the duration of individual contracts. Other things being equal, a player's performance increases by 2%-3% in the last year of the contract, indicating that players can—and indeed do—vary their effort levels strategically. Players with longer contracts and higher salaries tend to perform better on average, but salary levels alone do not guarantee performance increases.

Garcia et al., (2023) study aims to analyze the evolution of match running performance in relation to the age distribution of professional soccer players using a large scale analysis. The sample was composed of 36,883 individual match observations of 1,037 professional soccer players who competed in the First Division of the Spanish soccer league (LaLiga) across four seasons (from 2015/16 to 2018/19; n = 1,985 matches). The study found that younger soccer players covered significantly greater total distance, high intensity running distance, and very high intensity running distance and performed a significantly greater number of sprints than the other two groups (i.e., middle-aged and senior soccer players) across all season phases. These results are consistent with those previously reported in the first German league, where professional soccer players aged > 30 years showed a significantly lower performance in the TD covered, distance covered at high intensity, and the number of sprints compared with younger players. Their findings have shown that older players tend to reduce their ability to repeat high-intensity efforts over the years, due to different factors, such as their age-related decrease in strength or diminishing soccer-specific physical abilities.

McIntosh & Robertson, (2023) studied the relationship between contract status and player performance and found a weak negative relationship. This study analysed the extent to which player performance differs within the Australian Football League (AFL) with respect to the status of a player's contract. This gives an indication that external factors such as a player's contract status could drive performance. Whilst only a weak association was seen; this negative relationship suggests that the consistency of a player's performance leading into a contract negotiation can be used as a refined indicator of expected performance for matches after the signing of their contract, and should be taken into consideration to support decisions related to player contracting.

Heubeck & Scheuer (2002) explained and compared the incentive clauses of players' contracts in German soccer and clauses used in the NFL and NBA. The general situation in German soccer can be summarized as follows. In the first place, there is no labor union or other collective bargaining units with power comparable to the Players Associations in the NBA or NFL. There is also no compulsory standard contract. None of the European soccer leagues limits individual salaries of the players or the sum of salaries of a team. Players and clubs enjoy freedom of contract to a large extent. Thus, the precise conditions of the contract depend on the bargaining power of the player and the management. The salary of a player usually consists of the following components: a fixed monthly (gross) salary, a payment depending on the outcome of the game, and an annual bonus based on participation in the games. In contrast to German soccer there are labor unions representing the supply side of the labor market in the US in all four major sports. Collective Bargaining Agreements (CBA), which are negotiated between the players' union and

the leagues, regulate almost every sporting and business aspect of the game (Heubeck & Scheuer, 2002)

Data & Methods

Data

The sample consists of 34 attacking soccer players across multiple seasons (2017/18 to 2020/21) who played in the top five leagues (Premier League, Serie A, LaLiga, Bundesliga, Ligue 1) with a total of 136 observations. All players played at least 1000 minutes in a season. To ensure a meaningful analysis, only players who played at least 1000 minutes per season were included in the dataset. The dataset includes player statistics from top European leagues, obtained from soccer statistics sources such as FBref player stats and Transfermarkt for contract stats.

Variable:

- Performance (Dependent Variable): Performance is measured using a metric that includes goals, assists, total Shots on target, shot creating actions, goal creating actions, pass leading to goals, shots leading to goals, total successful dribbles and number of passes completed. This comprehensive measure collects various aspects of the attacking contributions.
- Contract Time Remaining (Independent Variable): ContractYearsLeft is the independent variable. It represents the number of seasons left on a player's contract at the time of observations. This variable is crucial because previous research suggests that players' performance may fluctuate depending on how much time is left on their contract. Players

nearing the end of their contract may increase their effort in order to secure a new contract or transfer to another team.

- Age (Control Variable): Age is an important control variable. As players age, their physical and cognitive abilities tend to decline, which can affect their performance. By controlling for age, the analysis can isolate the impact of contract status on performance, rather than relating performance changes to natural age-related decline.
- Games played (Control Variable): This variable observes the total minutes a player has played during the season. Since players who play more minutes have more opportunities to accumulate performance metrics, controlling for minutes played is important. This helps prevent bias from differences in playing time across players, ensuring that differences in performance are not due to unequal playing time.
- Discipline (Control Variable): Discipline is another control variable which is important because it reflects the players focus and behavior in the game. Here we are looking at the number of yellow plus red cards that the player gets. This is important because players get this card when they do rough tackle, argue a lot with refs, and other prohibited behavior. The metric used to calculate the Discipline is Yellow Cards + 2 * Red Cards (multiplied by 2 because red cards have more impact). Higher number for discipline indicates that player has committed more fouls and vice versa.

Estimation Method:

The dataset includes players over multiple seasons (2017/18 to 2020/21) which allows for analyzing the performance trends over time.

- Exploratory data analysis: The first step in the analysis will involve conducting exploratory data analysis (EDA). This will include generating summary statistics and understanding the variables. This will also help identify any outliers in the data that could affect the subsequent analysis.
- Statistical modeling: Techniques like multiple linear regression using fixed effects will be used to analyze the relationship between contract duration and performance. This approach will allow control of other important variables, such as age, minutes played, and discipline, while specifically examining how the remaining duration of a player's contract influences their performance on the field. The addition of a fixed effects model ensures that any time invariant factors such as a player's skill level are controlled for, allowing the analysis to focus on the changes in performance related to contract incentives. By accounting for this, the method provides a more robust and deeper understanding of how contract status and player effort are interconnected over time.

Theoretical Model

The relationship between player performance and contract status is measured using the following model:

$$Performance_{it} = \beta 0 + \beta 1 ContractYearsLeft_{it} + \beta 2 Age_{it} + \beta 3 MinutesPlayed_{it} + \beta 4 Discipline_{it} + \epsilon_{it}$$

Where:

i represents individual players

t represents time

$\beta 0$ is the intercept term, it represents the performance of player when all independent variables are zero

$\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$ are the coefficients that estimates the effect of each independent variable on the dependent variable, performance

ϵ_{it} is the error term for unobserved factors

This is a multiple regression model that measures the effect of contract status on performance by controlling for key variables. It includes ContractYearsLeft, Age, MinutesPlayed, and Discipline as independent variables. This will provide comprehensive analysis of the factors affecting player performance by including covariates that might also influence performance. It also includes the addition of a fixed-effects that accounts for player specific effects. It controls for individual characteristics that do not change over time (like player talent) by including entity (player) effects. The error term ϵ_{it} captures the residual variation in performance that cannot be explained by the independent variables included in the model. It accounts for any other unobserved factors that may influence player performance, such as psychological factors or external influences like personal life events.

In summary, this model provides a comprehensive approach to analyzing player performance by considering both observable factors (contract status, age, playing time, discipline) and unobserved player-specific effects. By including fixed effects, the model allows us to better isolate the influence of contract status on player performance, making the findings more robust and reliable.

Empirical Results

Summary stats of the whole dataset:

Metrics	Age	ContractYearsLeft	MinutesPlayed	Discipline	Performance
Count	136.00	136.00	136.00	136.00	136.00
Mean	27.82	3.21	2333.80	3.29	961.64
Std	4.12	1.21	593.16	2.43	346.36
Min	19.00	1.00	1014.00	0.00	350.00
25%	25.00	2.00	1957.00	1.00	704.50
50%	27.00	3.00	2386.50	3.00	939.00
75%	30.00	4.00	2810.00	5.00	1233.75
Max	40.00	5.00	3299.00	11.00	2527.00

Regression Model

Variable	Model 1: Simple Linear Regression(OLS)	Model 2: Multiple Regression (OLS)	Model 3: Fixed Effects (PanelOLS)
Intercept (const)	1057.62*** (84.12)	444.14* (232.77)	-
ContractYearsLeft	-29.94 (24.56)	-37.14* (23.18)	-50.85** (26.36)
Age	-	-0.999 (6.79)	-51.89* (27.47)
MinutesPlayed	-	0.272*** (0.046)	0.431*** (0.027)
Discipline	-	9.13 (11.13)	6.27 (6.63)
R-squared (Overall)	0.011	0.240	0.7311 (Within)
F-statistic	1.49	10.33	66.60**
Prob (F-statistic)	0.225	2.66e-07	0.0000
Number of Observations	136	136	136
Entities	-	-	34 (Players)
Time Periods	-	-	4

Coefficients marked with *** indicates that statistical significance is at the 0.01 level, ** at the 0.05 level, and * at the 0.10 level

Discussion

The summary statistics provides key insights into the dataset. Players age from 19 to 40 years old, with an average age of 27.82. Contract duration varies between 1 to 5 years, with an average of 3.21 years. Minutes played range from 1,014 to 3,299, with a mean of 2,333.8. Discipline, which is measured by yellow and red cards, averages 3.29, while performance scores range from 350 to 2,527, with a mean of 961.64. The statistics highlight differences in player attributes, which acts as the basis for additional analysis of performance factors.

Model Selection

Model 1 is a simple linear regression between the dependent variable (Performance) and independent variable (ContractYearsLeft). It analyzes a basic relationship between contract duration and player performance, without covariates. Model 2 is a multiple regression model that includes ContractYearsLeft, Age, MinutesPlayed, and Discipline as independent variables. This will provide comprehensive analysis of the factors affecting player performance by including covariates that might also influence performance. Model 3 includes the addition of a fixed-effects that accounts for player specific effects. It controls for individual characteristics that do not change over time (like player talent) by including entity (player) effects.

Main Predictor	Model 1	Model 2	Model 3
ContractYearsLeft	-29.94	-37.14	-50.85

Comparing across all the models, Model 3 stands out as the best model because of the coefficient and significance at 0.05 level. Model 1 and Model 2 have smaller contract effects. In Model 3 (with Fixed Effects), the coefficient increases in magnitude (-50.85), suggesting that controlling for player specific factors strengthens the effect.

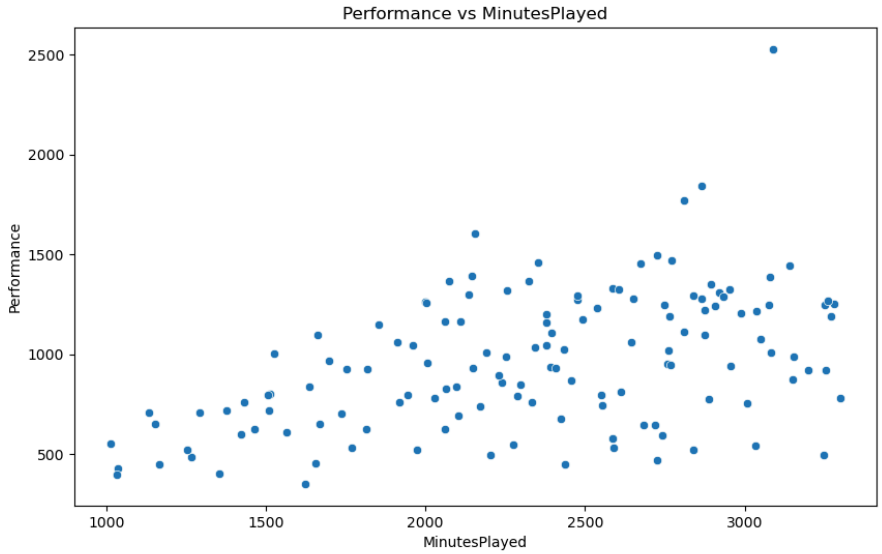
Main Predictor: Contract Years Left

The primary variable of interest, ContractYearsLeft, has a negative coefficient across all models, suggesting that players with more years remaining on their contract tend to perform worse. The result of coefficient of ContractYearLeft from the model 3 is -50.85 (which aligns with the expected sign). The coefficient of -50.85 means that for an additional year left in the player's contract, their performance decreases by 50.85 units.and this is statistically significant at the 0.05 level, which means that there is good evidence that the contract length has negative effects on player performance. The previous research related on performance and contract renewal has shown that the players tend to change their playing pattern. The results from Frick (2011) studies show that player's performance increased by 2% - 3% in the last year of the contract. This supports the idea that players tend to work harder and perform better when they are close to renewing the contract or trying to secure a new deal. Overall, this results supports the hypothesis that performance improves as players approach the end of their contracts, while longer remaining contract time may reduce motivation.

Other Factors Affecting Performance

The coefficient for age in Model 3 is -51.89, indicating a negative relationship between age and performance and this is statistically significant at 0.1 level. The result aligns with the idea that

performance is negatively related with age due to decline in physical ability of the player like speed, stamina, reaction time. While the experience of a player improves with age, physical performance is a key part of success in soccer, especially for attacking players. Therefore, as players grow older, their ability to perform at the same level as before may decrease.



Minutes Played has a strong positive impact on the performance. We can see the positive relationship between minutes played and performance in the above scatter plot. The coefficient 0.4313 indicates that players who play more minutes tend to play better. A one minute increase in playing time is associated with 0.4313 unit increase in the performance and this is highly statistically significant at all levels .This result makes sense because if a player gets more minutes their chance to contribute in the game increases. Playing more minutes also helps players to get comfortable playing with their teammates and also build the synergy. The result is as expected because when a player plays more minutes they have time to understand other player's and adapt to the playing style of the team. Discipline variable has a small positive

coefficient of 6.27 in Model 3. The higher p-value (0.3466) indicates that the result is not statistically significant. The expected sign for discipline is negative because discipline is calculated by adding a number of yellow cards and red cards. The unexpected positive sign might indicate that players are aggressive and want to get the ball more and end up committing fouls. Sometimes players might foul a player to prevent a goal scoring action for opponents and end up getting a card.

The R-squared for the model 3 is 0.7311 which indicates that 73.11% of variation in the player's performance is explained by the independent variables within each player over time. The high F-statistic (66.60) and low p-value (0.00) indicates that the model is jointly significant meaning that at least one of the independent variables is strongly related to performance.

Implications of Findings

The results suggest that longer contracts may reduce player motivation and effort, leading to a decline in performance. For example if a player has a 6 years contract then they will take time to adapt to the club and league and start to perform slowly but if a player has only 3 years of contract then they will need to adapt quickly and start performing in order to secure a new contract. From a manager's point of view, soccer clubs could benefit more by giving players shorter term contracts or adding rewards based on performance. This could help keep players motivated and working hard and getting the best out of them. This way, both the player and the club can benefit from this type of contract. Long contracts can give players financial security and help the club keep its best players, but they might also make some players feel too comfortable and not try as hard.

This case is not limited to sports but can be seen in other industries as well. In the corporate world, employees on contracts often put more effort then those who are employed full time and have job security. For example, employees with commission based contracts work harder than those with fixed salaries because they will be constantly compensated based on how they perform. These implications show that an organization should prioritize making an effective contract that motivates employees.

Limitations

The study is not without the limitations. While the fixed-effects model controls for player-specific characteristics, there are still many external factors that may influence the players performance but are not accounted for in this model. These include games missed due to injuries or number of times a player has suffered injury, which can affect players performance significantly; changes in coach or club management, which may lead to change in teams playing style that is hard to adapt for the player; and other personal factors such as family issues. Another limitation is the sample size of 136 observations limits the generalizability of the finding. A larger sample size with more seasons and players could improve the result. The study also relies on quantitative performance metrics such as goals, assists, passes and dribbles. While these are key indicators for attacking players, they do not capture the full ability of a player's contribution, such as off-the-ball movements, pressing, or tactical influence. Incorporating more comprehensive data and metrics could enhance the model.

Conclusion

In conclusion, this paper analyzed and measured the relationship between player performance and contract duration while accounting for factors like age, minutes played and discipline. The study showed a negative relationship between player performance and contract duration, suggesting that as players approach the end of their contracts, their performance tends to improve. This highlights the importance of contract structure in professional sports and suggests that shorter contracts or performance-based incentives could help sustain player motivation and maximize performance.

By examining contract-driven motivation, this research bridges the gap between sports analytics and economic theory, providing strategic insights into player management and contract negotiations. Clubs can use these findings to update and modify the contract policies, ensuring performance and productivity throughout a contract's duration. This can help clubs to get best out of the player and also give players the extra motivation to perform better and secure the contract.

Future research can expand on these findings by utilizing larger datasets, with additional performance metrics, control variables and exploring variations across leagues and different playing positions. Comparing the results across different leagues can also be done to understand variations in the performances. This would provide a more comprehensive understanding of the economic incentives that drive player behavior in professional soccer.

References

How does a football transfer work? (2022b, February 25). https://www.bbc.com/worklife/article/20170829-how-does-a-football-transfer-work

Globalsportspolicy. (2022, August 30). Everything You Need to Know about Football Contracts. *GSPR*. https://www.g-spr.com/post/everything-you-need-to-know-about-football-contracts

Everything you need to know about footballers' contracts. EF11 Sports Management. (2024, July 24). https://ef11sportsmanagement.com/about-footballers-contracts/

Reporter, G. S. (2024, April 15). Do footballers lose motivation after signing long-term contracts? *The Guardian*. https://www.theguardian.com/football/the-set-pieces-blog/2022/jan/22/footballers-long-term-contract-demotivate-players

Predicting soccer player transfer values. (2021, September 2). Kaggle. https://www.kaggle.com/datasets/sanjitva/predicting-soccer-player-transfer-values

Frick, B. (2011). Performance, Salaries, and Contract Length: Empirical Evidence from German Soccer.

https://www.researchgate.net/profile/Bernd-Frick-2/publication/227450873_Performance_Salaries_and_Contract_Length_Empirical_Evidence_from_German_Soccer/links/5698937908ae1c4279055f5b/Performance-Salaries-and-Contract-Length-Empirical-Evidence-from-German-Soccer.pdf

García-Calvo, T., Huertas, F., Ponce-Bordón, J. C., Del Campo, R. L., Resta, R., & Ballester, R. (2023b). Does player age influence match physical performance? A longitudinal four-season analysis in Spanish Soccer LaLiga. *Biology of Sport*, *40*(4), 1097–1106. https://pmc.ncbi.nlm.nih.gov/articles/PMC10588586/#abstract1

McIntosh, S., & Robertson, S. (2023c). Relationships between contract status and player performance in the Australian Football League. *Journal of Sports Sciences*, *41*(2), 89–99. https://doi.org/10.1080/02640414.2023.2190564

Heubeck, T., Scheuer, J., University of Hamburg, & University of Hamburg. (2002c). Incentive contracts in team sports - theory and practice. German Working Papers in Law and Economics, Volume 2002, Paper 17. https://core.ac.uk/download/pdf/6541053.pdf