WHAT DETERMINES THE TRANSFER FEE OF A SOCCER PLAYER?

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Abstract

This paper examines the theoretical framework of the TP-CP model that establishes the relationship between a soccer player's performance and his market value. An OLS estimation is used to investigate the characteristics that determine the transfer fee of a soccer player, and buying and selling behavior of soccer clubs during the transfer negotiation. The characteristics are divided into three categories: The characteristics of players, buying club, and selling club. Using cross-sectional data of 447 transfers in the English Premier League (EPL), including summer and winter transfer periods from July 2013 to May 2016, the results indicate that the characteristics tests explain a large part of the transfer fee of a player. In addition, the characteristics of players such as the average goals scored per game played increase the transfer fee of a player significantly. In fact, for every goal scored by a player, the transfer fee increases by approximately €9,112,000. This paper also deduces that the behavior of buying and selling clubs is largely methodical.

KEYWORDS: (Regression, Reservation Price, Characteristics, Transfer Fee, Estimation)

JEL CODES: (L83, C13)

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Sayorn Chin

Signature

TABLE OF CONTENTS

1 Introduction

1.1 Transfer Process

Soccer is the most popular sport in the world; from the favelas of Rio de Janeiro to the elite multi-thousand occupant arenas of such premier teams as Liverpool, soccer is enjoyed by millions the world over (Frick, 2007). The soccer clubs in top European leagues such as the English Premier League (EPL), Spanish Premier League (La Liga), Italian Premier League (Serie A), and the German Premier League (Bundesliga) purchase and sell players at a very high transfer fee compared to other leagues in the world. Since the record-breaking sale of Cristiano Ronaldo from Manchester United to Real Madrid in 2008, with a transfer fee of £80M, football players' market value is considered to be the most expensive asset for the club's balance sheet (Amir and Livne, 2005). In addition, the main reason soccer clubs compete in the business of acquiring and selling their players is to generate income. Because of this return on investment, wealthy teams are willing to spend vast amounts of money on superstar players to improve their team performance while at the same time garnering media attention and growing their fan base (Hall, Szymanski and Zimbalist, 2002).

Since the average transfer fee in general tends to increase in value each year, the Union of European Football Associations (UEFA) imposes Financial Fair Play Regulations to prevent big European soccer clubs from becoming enwrapped in financial obligations and debts from spending big money on players with little return profit.

Moreover, Financial Fair Play Regulations aim to protect the nature of competition in the league among small clubs who are operating with less financial advantage in comparison to big popular soccer clubs (UEFA, 2014). In recent years, especially large sums of money have been invested in superstar players- a figure which is projected to further multiply itself in the near future (Andref and Staudohar, 2000). The ultimate goal of this research initiative is to pinpoint, quantify, and implement the determining factors used to formulate the transfer fee, and proportional market value, of a soccer player.

1.2 Research Questions

The primary research question is: What determines the transfer fee of a soccer player? In order to answer this question, the supporting sub-questions are:

- What is the economic behavior of soccer clubs?
- What are the performance factors?
- How can a soccer player's performance be evaluated?

2 Background

2.1 Empirical Background

On the face of it, the economics of transfer seem straightforward. If a club wants to acquire a player, they negotiate a fee with said player's current club; should the two sides agree on a deal, the player is transferred. However, (Sloan, 1971) provides a sophisticated theoretical framework of the utility function capable of projecting the success of a soccer

club. Part of this utility is the source of income which can be generated from transfer fees, the selling of broadcasting rights & gate tickets, and merchandising. In addition, Sloan claims that every soccer club is a utility maximizer or revenue maximizer subject to financial constraint. On the other hand, (Dobson and Gerrard, 1999) revise the theoretical framework of the TP-CP model that previously shows the presence of monopoly rents that the actual price lies between the reservation price (maximum price) of the buyer and the reservation price of the seller. In addition, this revised TP-CP model deviates from the previous model by observing new determinant fee variables, including player performance statistics, buying club characteristics and selling club characteristics. Thus, the revised TP-CP model is looking at the reservation price of the selling club that is the net present value of a player and his expected impact on team performance and the profit he generates for his club. Moreover, Dobson and Gerrard stress that the value of a player to the soccer club depends on his "contribution to both the sporting and financial performance of the club". Furthermore, the derivation of the TP-CP model emphasizes the relationship between team performance and profit. As expected, this demonstrates that soccer clubs' ability to attract corporate sponsorship is due in part to how well their respective teams perform on the field.

(Carmichael and Thomas, 1993) view on the economic determinants behind transfer fees of the soccer clubs is centered around the bargaining process. They point out from their findings that the decision to agree on a transfer fee lies somewhere between the

selling club's reservation price and the buying club's maximum bid price. This is contrasted by (Szymanski and Smith, 1997), who argue that the competitive nature of soccer clubs' bidding culture is the primary generator of transfer value. Thus, the transfer fee is established at the reservation price of the selling club and the bid can be made due to the selling club's maximum acceptable fee or the reservation price.

(Dobson and Gerrard, 1997) stress that the main reason clubs sell their players is to increase income and reduce costs (e.g. wages), and to alleviate financial obligations and debts. To the contrary, clubs buy players to improve team performance and compete with other teams after satisfying the profit-budget constraint. (Antonioni and Cubbin, 2000) discover that the selling club will only keep the player if the transfer payoff is less than the expected utility gained from keeping said player on contract. Therefore, most soccer clubs will make the economic decision to sell a player when he nears the end of his playing career, thereby earning a fee rather than losing that player sans financial return.

The determinant of a player's performance-based transfer value to any club is, by definition, his performance on the pitch. Regardless of whether a soccer player contributes a significant 'media value' to the team, that player's primary task is to help his team win games. (Carmichael and Thomas, 1993) draw on data of 214 transfers in the English Premier League in the season 1990/1991 using OLS regression with log of transfer fee as a dependent variable, finding a positive correlation between log transfer fee and player characteristics such as goals-per-game, player age, and previous season career games

played to be significant within their model. The goal-scoring statistic implies the rating of a player's performance in a match. In addition, there is a clear link between the amount of goals a player scores and the value he provides for his club. By scoring goals, a player obviously adds significantly to the probability of his team winning a game. Furthermore, they find that average goals scored is positive and significant at the 1% level, and for every goal scored by a player in the previous season, increases the transfer fee by 4%. The number of games played in the previous season highlights the performance of a player, bolstering his value to a higher margin within the transfer market.

Similarly, (Feess, Frick and Muehlheusser, 2003) theoretically and empirically analyze the impact of transfer fee regulations on professional soccer in Europe, using OLS regression as well as Heckman two-step estimation (with n = 604) from the data of 239 transfers in the German Bundesliga in the season 1994/1994 – 1999/2000. Their results find player age and career games played to have a significant positive correlation with the log of standardized transfer fee. Moreover, they also observe that international appearances and player's position of being a forward to be significant. Indeed, a player's number of appearances in international competition (i.e. World Cup and European Championship) is another determinant player value. Usually, a player is called up to represent his national team based on his talent and performance for his club team.

Fees, Frick and Muehlheusser also stress that the forward position tends to correspond to higher transfer fees than those of defenders or a goalkeepers, since the

performance of a forward player can be more directly linked to scoring, and thus game winning, than that of other positions on the pitch. As demonstrated by their final model, for every goal scored by a forward player increases the transfer fee by 2.9% at the 1% level. Likewise, (Frick and Lehmann, 2001) come to similar conclusion in their findings, using 1,211 out of 1,269 transfers in the German Bundesliga in the seasons 1983/1984 – 1999/2000, and running OLS regression with log of transfer fee in constant 1985 prices as the dependent variable. Their research shows that characteristics such as age, career games played, goals, and international appearances are positively correlated with transfer fee. Furthermore, (Dobson and Gerrard, 1999) and (Gerrard, 2001) also use a multiple regression and hedonic-pricing approach and have a high correlation of fit (R-squared = 0.79 and 0.73, respectively).This means that the variables in their models had a high percentage of determination in players' transfer fees.

It is also important to assess a soccer player's transfer value from his current and potential club characteristics, as one soccer club's financial motive can be different from another. (Carmichael and Thomas, 1993) imply that a soccer club's ability to obtain a player from another club is based on different sources of income. One of the sources of income is generated from the sale of gate tickets. In their findings, Carmichael and Thomas notice that average buying club attendance in season prior is positively significant within their model. This entails a likely increase in stadium capacity, and is therefore essentially a measure of revenue potential. Furthermore, Carmichael and Thomas also note

that league position of both selling and buying clubs in previous season is also significant. This is important as the higher in the league table a team finishes, the more that team has to pay its players. At the same time, however, that team can charge a higher consequent premium for players it sells. This could be a possible explanation for why less popular clubs get bargains on players for which elite clubs will have to pay two to three times that amount.

Similarly, (Speight and Thomas, 1997) explore the arbitrated settlements of disputed transfer fees for end-of-contract players in the English Premier League. They use OLS regression with natural logarithm of transfer fee in constant 1990 prices and find league position in the previous season of both buying and selling clubs is significant at the 1% and 5% level, respectively. Moreover, their results also show that average gate attendances for the buying club is positive and significant at the 5% level with R-squared of 0.85. However, the selling club's average gate attendance in the season prior to the transfer is left out from their final specification, as it is shown to be insignificant.

2.2 Theoretical Background

(Dobson and Gerrard, 1999) convert the model created by (Dobson and Gerrard, 1997) into an econometric model. In this paper, utility function is central to their revised model, as the utility function of the soccer club is assumed to have two arguments: team performance and club profits (Sloan, 1971). Given that the soccer club's objective is to

maximize profit, a valuation of a player depends on the expected impact of the player on the team performance and club profits.

In their revised model, (Dobson and Gerrard, 1999) assume that the transfer of player *i* from selling club *k* to buying club *j*, and define V_{ij}^{B} as the valuation of player *i* to the *j*th buying club over the period of the contract. Therefore, the valuation equation for a player *i* of the buying club is built on the expected change in team performance, ΔQ_{ij}, and revenue, ΔR_{ij}. The buying club valuation of a player *i* can be presented as follow:

$$V_{ij}^{B} = V_{ij}^{B}(\Delta Q_{ij}, \Delta R_{ij}) \quad (1)$$

In their equation, (Dobson and Gerrard, 1999) also emphasize that ΔQ depends on how a potential player's quality of the buying club compared to the quality of the existing team of the buying club. Furthermore, ΔR comes on the increases in gate selling tickets revenue and other revenue from corporate sponsorships, but these revenues heavily reliant upon team performance. Furthermore, (Dobson and Gerrard, 1999) state that with the given buying club valuation function (1), the reservation price (maximum price) that the *j*th buying club is willing to pay in order to purchase player *i* is formally presented in the following function:

$$T_{ji}^{B} = V_{ji}^{B} - W_{ji} - S_{ji} - \Delta T_{ji}^{e} \quad (2)$$

(Dobson and Gerrard, 1999) define W_{ji} as the wage cost of the soccer club's accounting sheet. This cost is the duration of a player during his contractual period with the club. Furthermore, S_{ji} represents as the signing-on fee paid to the player when the contract is agreed upon, and T_{ji}^{e} is the expected "end-of-contract" transfer fee.

From the selling club's point of view, (Dobson and Gerrard, 1999) explain that the *k*th selling club's valuation of a player *i* is similar to the buying club valuation equation, as it depends on the expected change in team performance, ΔQ_{ik}, and club revenue, ΔR_{ik}, over the remaining period of player i current contract. From these given components, they formally derive the selling-club valuation as the follow function:

$$V_{ki}^{S} = V_{ki}^{S}(\Delta Q_{ki}, \Delta R_{ki}) \tag{3}$$

Moreover, (Dobson and Gerrard, 1999) explain if the selling club were to behave the same as the buying club, in other words, if the selling club is a "rational agent", then the reservation price of the selling would be represented in the following function:

$$T_{ki}^{S} = V_{ki}^{S} - W_{ki} + \Delta T_{ki}^{e} \tag{4}$$

Similarly to the reservation price of the buying club function, W_{ki} is the current value of the wage costs of player *i* remaining in the selling club's balance sheet until the player is sold. Furthermore, ΔT_{ki}^{e} is defined as the value of appreciation or depreciation in the expected transfer fee if player *i* is sold toward the end of his contract.

In summary, from the theory of player valuation provided by (Dobson and Gerrard, 1999), the reservation price or maximum price of a player *i* being sold to another club is the current valuation V_{ki}^{S} plus profits from selling minus future wage costs, (W_{ki}). From the buying club point of view, the expected selling price is deducted from player *i* value, and the profit generated by the buying club is the present value of reselling player *i* at a later point. Thus, the two functions developed by Dobson and Gerrard, (1999) can be defined as followed:

$$\text{Reservation Price of Buying Club: } T_{ji}^{B} = V_{ji}^{B} - W_{ji} - S_{ji} - \Delta T_{ji}^{e} \quad (5)$$

$$\text{Reservation Price of Selling Club: } T_{ki}^{S} = V_{ki}^{S} - W_{ki} + \Delta T_{ki}^{e} \quad (6)$$

According to (Dobson and Gerrard, 1999), if both the buying and selling club is a rational agent, the actual price lies between the two edges of the functions (5) and (6). In order to determine the actual transfer fee of player *i*, functions (5) and (6) are necessarily converted into an econometric model. From the understanding of the theoretical framework

explained by (Dobson and Gerrard, 1999), the following basic specification which assumes linearity, explain the price of a player *i:*

$$T_i = \beta_0 + \beta_1 * P_i + \beta_2 * S_{ki} + \beta_3 * B_{ji} + \beta_4 * Z_i + \varepsilon_i$$

In Dobson and Gerrard's theoretical model, T is the transfer fee agreed and paid by the buying club to the selling club of a player *i*. P is the personal characteristics/statistics of a player *i* prior to the transfer from his current club in the previous season. S is the selling club characteristics and B is the buying club characteristics which influence the transfer fee of a player *i*. Z represents the set of other control variables; in the case of (Dobson and Gerrard, 1999), Z accounts for time-dependent effects. The last term, ε, is a random error.

3 Data and Methodology

3.1 Data and Descriptive Statistics

This study uses the sample of 447 transfers from July 2013 to May 2016 in the English Premier League (EPL), including summer and winter transfer periods. EPL's clubs purchase and sell their players directly from and to another EPL's club. They also acquire players from top European clubs, including Spanish Premier League (La Liga), Italian

Premier League (Serie A), German Premier League (Bundesliga), French Ligue 1, Dutch Premier League (Eredivisie), and Scottish Premier League (SPL).

All the data use for this paper is obtained from various reliable and trusted sources. Data on all the transfer fees are secured from www.transfermarkt.com. The transfer fees are originally in euro (€) and maintained as euro to avoid conversion problem. On the other hand, data on players' statistics and clubs' characteristics are collected from www.espnfc.us. All transfer activities are recorded, except from players who are transferring to and from lower divisions. Also, players who are out of contracts and out on loan are excluded from this study.

Table 3.1 in the appendix section shows the descriptive statistics of all the relevant variables. Since the number of goals scored by a player is mentioned in the previous empirical papers as one of the most important indicators to drive up the transfer fee, average goals scored in the previous season is given a closer look in relation to each position on the field, including defender, midfielder, and forward.

Table 3.2 - Average Goals Scored by Positions

Variables	Observations	Mean	Standard Deviation	Min	Max
Defender	146	0.0517123	0.0605988	0	0.36
Midfielder	204	0.1910294	0.1575534	0	0.70
Forward	97	0.4813402	0.2209762	0	1.17

Table 3.2 shows the descriptive statistics of the average goals scored in the previous season (AVGOALS) categorized by positions. Forwards score, on average, 0.48 goals per game in their career up to the transfer period. Defenders, however, only score 0.05 goals per game. This indicates that, on average, forward players score 860% goals per game higher than a defender. Midfielders score on average 60% goals per game less than forward players, scoring 218% goals per game more than a defender. This is supported by (Carmichael and Thomas, 1993), as their results show that a forward is more expensive than both midfielders and defenders. Thus, the increase in the transfer fee is more imposed upon forward players.

3.2 Methodology

In Carmichael and Thomas' paper, the natural logarithm of the transfer fees was used instead of the actual transfer fee agreed upon by the two soccer clubs. The main reason for this adjustment was that the use of the logarithm on the actual price of the transfer was better fitted against the theoretical model, as the increase in the price of the transfer is exponential as the players become more expensive. The natural log function succeeds in linearizing this exponential function by collapsing the y-scale. This was further necessary to avoid the problem of heteroscedasticity in the model. The differences between the actual transfer fees and the natural logarithm of the transfer fees can be illustrated with the following normal probability plots:

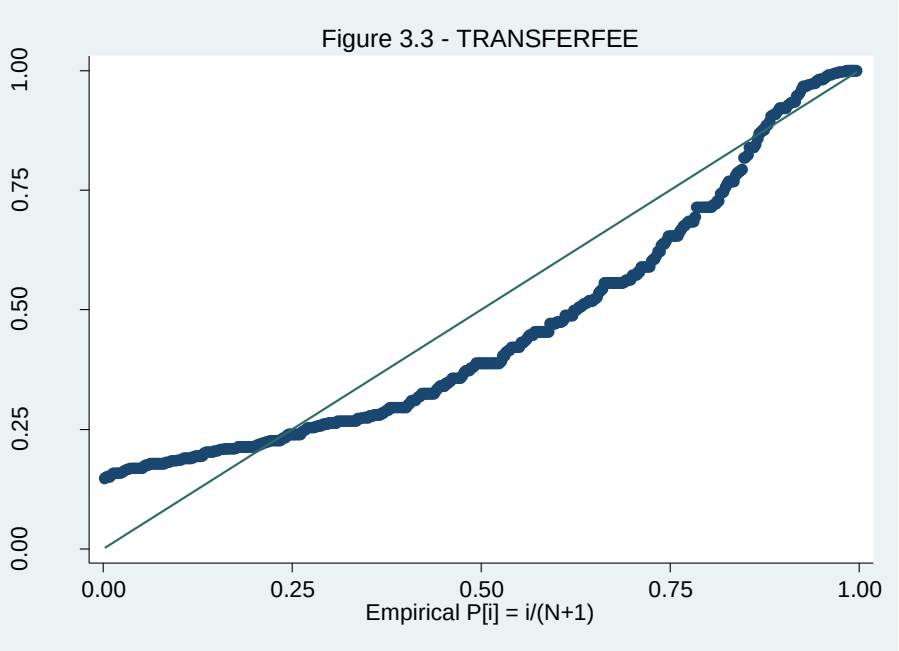
Figure 3.3 - TRANSFERFEE
0.00
0.25
0.50
0.75
1.00
0.00
0.25
0.50
0.75
1.00
Empirical P[i] = i/(N+1)

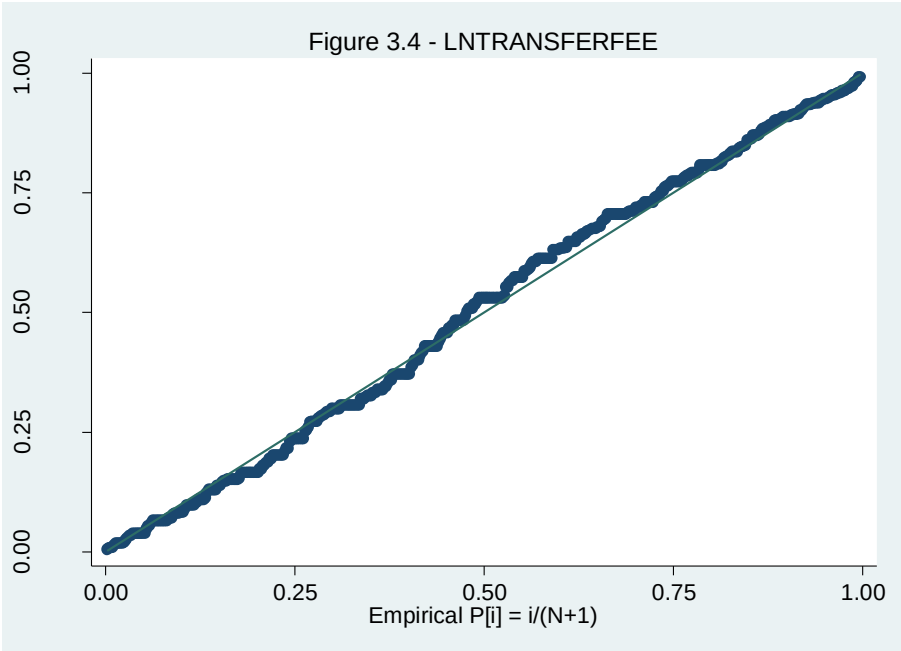
Figure 3.4 - LNTRANSFERFEE
0.00
0.25
0.50
0.75
1.00
0.00
0.25
0.50
0.75
1.00
Empirical P[i] = i/(N+1)

Given the fact that the data points almost align with the normal distribution line in Figure 3.4, it appears that the transfer fees at which players transfer in this dataset is approximated by a normal distribution. Therefore, the dependent variable for constructing the econometric model for this paper will be the logarithm of the transfer fees instead of the actual transfer fees.

In previous studies, the independent variables were divided into two categories: players' statistics and the characteristics of both buying and selling clubs. The following table gives a summary of the players' personal characteristics and the expected sign of the related coefficient.

Variables	**Description**	**Expected Sign**
DEF	Dummy variable. 1 if defender, otherwise 0	+
MID	Dummy variable. 1 if defender, otherwise 0	+
FOR	Dummy variable. 1 if defender, otherwise 0	+
AGE	Age of a player at the start of the season of the transfer	+
AGEQ	Age of a player at the start of the season of the transfer squared	-
CLUBAPP	League appearances in the previous season.	+
AVGOALS	Average goals scored in the previous season.	+
ASSIST	Total club and international assists in the previous season	+
INTERCAP	International appearances in the previous season.	+

One of the factors that differentiate a player's transfer value is his position on the pitch. (Feess, Frick and Muehlheusser, 2004) assign three dummies for a defender, a midfielder, and a forward. The three positions also show positive coefficients. Therefore,

the expected sign will be positive. Since a goalkeeper is not included in their model in the first place, it is assumed to be insignificant, in order to avoid a singular matrix. Another player's personal characteristic to include in the model is *AGE*. From their results, (Speight and Thomas, 1997) find that a player's age is significant and positive at the 5% level. Player performance increases with player age and experience, albeit at a decreasing rate, up to a certain point. As players reach their peak performance level, age will be valued negatively, as player performance will decrease. As such, the overall relationship between player age and his valuation may be assumed to be non-linear and for this reason, Speight and Thomas create a quadratic form for the age variable (*AGEQ*) which allows the impact on the transfer fee to vary over time.

In their studies, (Carmichael and Thomas, 1993) record the number of goals scored by the player by taking the total goals scored in the previous season divided by total appearances in the same season. Carmichael and Thomas explain that there is a possible interaction between the number of goals a player scored and the number of games played. Therefore, for a player to score more goals, he has to play more matches. For this reason, averaging the number of goals scored in the previous season is the best method to avoid multicollinearity. Furthermore, Carmichael and Thomas also stress the importance of the number of appearances during the season prior to the transfer, as their results show that for every game played by a player, there is a 2% increase in his transfer fee value. Also, the number of matches is assumed is to reflect form and, possibly, general fitness of a player.

In addition to this, there is a positive coefficient and significant at the 1% level. Therefore, the expected sign for the variables CLUBAPP and INTERCAP is positive. On the other hand, the interaction between a forward player and the average goals scored is overlooked in the previous empirical studies. Thus, it is worthwhile to see whether this interaction has a significant effect on the transfer fee.

Although the number of assists made by a player in the previous season did not mention in any of the previous studies, it is essential that the variable ASSIST is included in the initial regression as shown in Specification I to determine the interaction of a midfield player, as a midfielder is primary bought to create chances for a forward player to score goals.

For the relevant club characteristics, (Carmichael and Thomas, 1993) point out that the strength of a soccer club is the reflection of the overall status of a club in terms of its playing success (league position) and profitability. The following table is the summary of the independent variables of the club characteristics.

Variables	**Description**	**Expected Sign**
BPOS	The position of the buying club in the league in the previous season.	-
SPOS	The position of the selling club in the league in the previous season.	-
BATT	Average gate attendance of the buying club in the previous season.	+
SATT	Average gate attendance of the selling club in the previous season.	+

As mentioned earlier in the literature review section, (Speight and Thomas, 1997) include both buying and selling clubs' league position in their model and find that there are negative coefficients related to the natural logarithm of transfer fee. This is supported by Carmichael and Thomas, as the ability of a soccer club to win silverware or cups and generate broadcasting revenues is determined by how high up in the league a team is. Therefore, the expected sign for both variables BPOS and SPOS is negative.

Although the demonstration of a soccer club's strength is its profitability, (Speight and Tomas, 1997) replace the measure of a team's profitability with the average gate attendance due to limited and lack of availability of data. This can be explained that the richer club is most likely to have a larger stadium capacity and fan base. Thus, the greater the average gate attendance the greater the transfer fee. This is also agreed by (Carmichael and Thomas, 1993), as both variables BATT and SATT are expected to be positively correlated with the transfer fee.

Since the data on the transfer fees used for this paper only accounts for three years period, Z will not include in the model. An OLS regression will be used to estimate the unknown $\beta's$ and the econometric model is constructed based on (Dobson and Gerrard, 1999), (Carmichael and Thomas, 1993), and (Speight and Thomas, 1997). The following equation is an econometric model:

$$ln(T)_i = \beta_0 + \beta_1 * DEF_i + \beta_2 * MID_i + \beta_3 * DEF_i + \beta_4 * FOR_i + \beta_5 * AGE_i + \beta_6 * AGEQ_i + \beta_7 * CLUBAPP_i + \beta_8 * AVGOALS_i + \beta_9 * INTERCAP_i + \beta_{10} * SPOS_{ki} + \beta_{11} * BPOS_{ji} + \beta_{12} * SATT_{ki} + \beta_{13} * BATT_{ji} + \varepsilon_i$$

T and the subscripts i, k, j are defined in the theoretical background section. It is assumed that ε_i is independently and identically distributed (i.i.d.) which implies that there is no correlation between observations of the natural logarithm of transfer fee.

4 Results and Discussion

4.1 Preliminary Regression

The purpose of this regression is to determine whether the interactions of the variables MID*ASSIST and FOR*AVGOALS have an impact on the transfer fee since a midfielder primary job is to create chances and assist a forward player to score goals for the team.

As shown in Specification I, the results suggest that both MID*ASSIST and FOR*GOALS show insignificance with T-statistics at 1.51 and 1.39, respectively. Therefore, it is not possible to determine the transfer fee from these results.

Specification I - Regression Estimates (Dependent Variable: LNTRANSFERFEE)

Independent Variables	**Coefficient**	**T-statistic**
CONSTANT	12.37588	7.96***
DEF	-0.2606321	-1.72*
MID	-0.1142393	-0.76+
FOR	(omitted)	(omitted)
FOR*AVGOAL	0.0117383	1.39+
MID*ASSIST	0.0289472	1.51+
AGE	0.2746608	2.22**
AGEQ	-0.0065783	-2.7***
CLUBAPP	0.0170723	5.47***
AVGOALS	0.4544933	1.84*
ASSIST	-0.0110129	-0.62+
INTERCAP	0.0195137	2.33**
BPOS	-0.0280728	-3.62***
SPOS	-0.0163288	-2.28**
BATT	0.0000169	6.16***
SATT	2.82E-06	1.30+
N	447	
F-statistic	37.92	
Prob (F-statistic)	0.0000	
R^2	0.4895	

*** Indicates significance at the 1% level, ** at the 5% level, * at the 10% level.
+ Indicates insignificance.

Similarly, the goals scored per match played (AVGOALS) is only significant at the 10% level. This is not consistent with the findings of (Carmichael and Thomas, 1993), in which the variable, average goals scored, was significant at the 1% level. In addition, the variable FOR is omitted from this model because of collinearity.

(Carmichael and Thomas, 1993) have claimed that the number of assists created by a player in the last season prior to the transfer period is insignificant and should therefore be excluded from relevant regression models. The results of variable ASSIST shown in Specification I illustrate that this variable was insignificant in the present study, supporting previous studies' conclusions.

4.2 Final Regression

After removing some variables from the preliminary regression as shown in Specification II, the OLS estimation of the natural logarithm of the transfer fee (LNTRANSFERFEE) has an R-squared of 0.49, which implies that 49% of the variation in the dataset is explained by this regression.

For the players' characteristics, the results show that AGEQ is significant and negative at the 1% level. In fact, the net effect of both AGE and AGEQ shows that between the ages of 27 and 28 the transfer fee decreases by €897,800 as contradicted to a big decrease of €1,098,800 between the ages of 29 and 30. This can be explained in line with the hypothesis that the transfer fee decreases more as a player becomes older and the quadratic AGEQ implies that the fee goes up with age, at a decreasing rate. The dummy variable MID is significant and positive at the 1% level, which suggests that, all externalities controlled, the transfer fee for a midfielder is almost 32% lower than for a forward. Because midfielders and forwards are the most critical offensive players, there are premiums for these players, increasing their value.

Specification II - Regression Estimates (Dependent Variable: LNTRANSFERFEE)

Independent Variables	**Coefficient**	**T-statistic**
CONSTANT	11.65469	7.53***
MID	0.2153797	2.90***
FOR	0.3183708	2.54**
AGE	0.3008905	2.44**
AGEQ	-0.0070962	-2.93***
CLUBAPP	0.0190024	6.90***
AVGOALS	0.6764591	3.19***
INTERCAP	0.0232691	2.84***
BPOS	-0.028403	-3.66***
SPOS	-0.016353	-2.27**
BATT	0.0000174	6.40***
SATT	3.52E-06	1.66*
N	447	
F-statistic	37.92	
Prob (F-statistic)	0.0000	
R^2	0.4895	

*** Indicates significance at the 1% level, ** at the 5% level, * at the 10% level

Earlier studies have found defenders to be insignificant in determining their transfer fee. For this reason, the current study eliminated the variable DEF from the models. This exclusion caused the variable, FOR to become positive and significant at the 5% level. This implies that for every goal scored in the season prior to the transfer by forward players, there is a €4,288,000 increase in the player's transfer fee.

Appearance in the season prior to the transfer (CLUBAPP) displays significance and is positive at the 1% level. This verifies Carmichael and Thomas' results that form and

fitness are important in the determination of the transfer fee. In fact, for every appearance in the previous season, the transfer fee increases about 1.9% or €254,600. In addition, every game played for the national team increases the transfer fee by approximately 2% or €268,000. This illustrates that a player with more international appearances to his name will significantly drive up his market value. Furthermore, the result demonstrates that in the season previous to the transfer, the average goals scored per game played (AVGOALS) is significant at the 1% level. This is because goal-scoring is one of the most important indicators for a buying club in determining the transfer price. As for every goal scored by a player, the transfer fee increases by almost 68% or €9,112,000 in actual value. However, no player in this dataset scores more than 1.17 goals per game on average. Therefore, since forward players, in reality, are scoring more goals per game on average than players in other positions, the settlement of the transfer price between both buying and selling clubs for midfield players, ceteris paribus, is indeed less expensive than forward players.

Considering the characteristics of the buying and selling clubs, the results show that the buying club average gate attendance is a positive coefficient. In fact, an increase of 1000 spectators increases the transfer fee by 1.7% or €227,800. However, the selling club average gate attendance is only shown to be significant at the 5% level in the regression. It is hard to pinpoint why this is the case, since the buying club average gate attendance is significant at the 1% level. An explanation for this may be that the buying club has

generated a lot of money from selling gate tickets in the previous season. Essentially, gate attendance is used as a metric for the club's strength.

On the other hand, clubs' previous league position is shown to be significant but negative for both buying and selling clubs, at the 1% and 10% level respectively. The possible explanation for this is that the buying club's position in the previous season is also associated with a premium. When a top tier club is interested in a player, the selling club has to sell, knowing that a current player will not be satisfied with the club's last season performance. Thus, the buying club's previous ranking may result in this significant but negative relationship. For example, the clubs who are relegated from the English Premier League in the previous season are forced to sell their players on a cheaper price than clubs with higher positions in the league. In this case, selling clubs are selling their players by approximately 1.6% or €214,400 less than their actual market values.

4.3 Robustness Checks

To confirm the results shown in Specification II, the tests for heteroskedasticity and model misspecification are recorded in Tables 4.1, and 4.2 below:

Table 4.1 - Breusch-Pagan / Cook-Weisberg Test

Variable	**Outcome**	H_0
LNTRANSFERFEE	chi2 (1) = 1.11 Prob > chi2 = 0.2913	Constant variance

In order to test for heteroskedasticity, the Breusch-Pagan / Cook-Weisberg is used to determine the probability that the errors stay constant as the independent variables

change. In Table 4.1, the insignificance and high p-value of 0.2913 indicates that heteroskedasticity is not a problem in the final regression model. Thus, the null hypothesis (H_0) is not rejected.

Table 4.2 – Ramsey RESET Test

Variable	**Outcome**	H_0
LNTRANSFERFEE	F(3,432) = 1.32 Prob > F = 0.2683	No omitted variables

For the model misspecification check, Ramsey REST test is used to see whether non-linear combinations of the fitted values help explain the response variable. In this case, the higher order term of AGEQ is significant and the RESET test suggests no evidence of functional form misspecification as shown in Table 4.2. Therefore, there is no reason to reject the hypothesis that the correct specification is linear. Overall, the OLS estimation in Specification II appears to be correct.

4.4 Discussion

There are several limitations in conducting this study. One limitation is the lack of empirical studies on transfer fees in smaller leagues. Therefore, it is a challenge to determine whether the results from this study accurately represent all soccer leagues, regardless of size.

Another limitation is the availability of data. For instance, players' characteristics, such as goals and appearances prior to the mid-2000s are not easily accessible. Moreover,

the results could probably improve from expanding the dataset to a span of at least ten years, instead of just three. A larger sample would increase the accuracy of the OLS estimates. In addition, data sources provide limited information on potentially valuable statistics. For example, minutes played, average number of passes, average number of dribbles completed, average distance covered per game, the number of soccer-jersey sales, and the duration of player injuries were inaccessible to the researcher, resulting in their exclusion from this study.

Buying and selling clubs' previous seasons' goal differences, i.e. total goals scored by the team minus the goals scored against them, should also be considered for future research. This variable can be an important proxy of the team's success. Therefore, it will likely have an impact on the transfer fee.

Also, the number of transfers tested in this study is not very large, with N = 447. In addition, selection bias is likely a problem here. The researcher only gathered data pertaining to players transferred between top European leagues. This excluded players transferred to and from lower divisions between 2013 and 2016.

Although the data on the transfer fees used for this paper only accounts for three years period, the inclusion of the time-dependent effects (Z) will probably give interesting results as the players' market values are varied with the effect of inflation.

5 Conclusion

The OLS regression produces results that are consistent in terms of direction and significance of the explanatory variables with (Dobson and Gerrard, 1999), (Carmichael and Thomas, 1993) and (Speight and Thomas, 1997), whose findings indicate that the characteristics of players, buying clubs, and selling clubs determine players' transfer fees. However, in terms of the magnitude of the results, for example, (Carmichael and Thomas, 1993) indicate that player characteristics of average goals scored per game (AVGOALS) and league appearances (CLUBAPP) are worth approximately 4% and 2%, respectively, on the fee while the impact of an additional year to a soccer player's age depends on the difference between the squares of the relevant ages. For example, between the ages of 25 and 26 a player's fee could be expected to fall by approximately 4.5% whilst between the ages of 29 and 30 the corresponding reduction is 5.2%. The magnitude of these results somewhat seems to be differentiated from the current findings as shown in Specification II. Therefore, the possible explanation for this is the inflation imposed on the transfer price of the players over the different time periods of data collection.

On the other hand, given that both Carmichael and Thomas' and Speight and Thomas' findings of average gate attendance are insignificant, the variable SATT shown in Specification II is significant at the 10% level. The possible explanation for this is the difference in the time periods between this study's dataset and those used previously. For instance, the increase in fan bases for most soccer teams enables clubs to reconstruct new

stadiums and thus generate more profit. This suggests that the data used in this analysis may not parallel those used in previous studies.

On the whole, the result indicates that the characteristics of players are the true mechanism behind the economic behavior of buying and selling clubs when it comes to the transfer period. Soccer clubs with less financial constraint are likely to be the one to acquire players with remarkable performance statistics in the previous season from clubs with less revenue. For example, smaller clubs like Leicester City usually has to sell their best players due to the inability to match the players' wage demand. Therefore, a player is an asset, a productive element but also a brand value creator that bigger clubs like Liverpool is willing to pay a much higher wage than that of Leicester City. In some cases, this last feature may explain most of the money paid for players that somehow attract more fans and corporate sponsorships for their respective soccer clubs.

However, the results of this study should be interpreted with caution. There are a number of characteristics (e.g. player's wage) not included in this paper that could have affected the valuation of a player in the period under examination. Future researchers, nonetheless, can identify and examine the impact of such characteristics from the growing availability of data in soccer. In addition, future research of the transfer fee on players from less popular leagues (e.g. South America or Asia) would provide a particularly interesting opportunity for future researchers to test whether a player's transfer fee is determined by the variables used in this study.

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Appendix

Table 3.1 - Descriptive Statistics

Variables	N	Mean	Std. Dev.	Min	Max
TRANSFERFEE	447	13400000	11800000	1000000	75000000
LNTRANSFERFEE	447	16.04989	0.8746962	13.81551	18.133
DEFENDER	447	0.3310962	0.4711349	0	1
MIDFIELDER	447	0.4563758	0.4986514	0	1
FORWARD	447	0.212528	0.4095547	0	1
AGE	447	24.9396	3.083796	18	36
AGEQ	447	631.472	156.3186	324	1296
CLUBAPP	447	29.57494	11.97412	3	121
AVGOALS	447	0.2085235	0.2176692	0	1.17
INTERCAP	447	2.44519	3.872522	0	23
BPOS	447	8.624161	4.842557	1	17
SPOS	447	6.870246	4.787988	1	18
BATT	447	38887.52	13322.96	11168	75530
SATT	447	35965.17	15600.97	6905	81072