ECONOMETRIC ANALYSIS OF THE RELATIONSHIP BETWEEN ENGLISH PREMIER LEAGUE TEAM'S TRANSFER MARKET ACTIVITY AND LEVELS OF ON-FIELD PERFORMANCE

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Preface and Acknowledgements

I have watched football and namely the English premier league for as long as I can remember, that coupled with my deep love for economics and analytics has led me to this Senior Individualized project which utilizes my knowledge of both areas to analyze the economics and impacts of the transfer market on a team's on-field performance.

First and foremost I would like to first and foremost thank God for preserving both my physical and mental health as I completed my Senior Individualized Project. Secondly, I would like to thank my SIP advisor, Dr.Darshana Udayanganie for her unwavering support and help throughout my research and analysis. I cannot even begin to thank her enough for her guidance and wisdom both on this project and in life. I would also like to thank the economics department for providing financial support for a STATA course I needed to complete this paper. Finally, I would like to thank the members of my family, whose love and guidance has been with me in every endeavor I take on in life.

Abstract

The transfer market and player transfers play a central role in the realm of football and even more so in the English premier league which is often referred to as the paragon of football leagues. Though the transfer market plays such an integral role in the realm of football, it has hardly been researched empirically. This paper aims to observe the link between the transfer market and the performance of teams participating in the English premier league in the last 10 years by using regression analysis. From the regression analysis, it was concluded that Net expenditure, the difference in total transfer income, and total transfer expenditure can positively impact a team's performance while the number of transfers a team completes and a higher payroll can negatively impact the team's performance.

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1.0 Introduction

Since the inception of the major European football leagues, teams have had the opportunity to improve their team by recruiting young talents through their youth academy and eventually promoting them to the senior squad or by maneuvering the transfer market to obtain the best players from other clubs by purchasing the player and paying their wages. The transfer market offers football clubs the opportunity to sign players by means of a transfer fee. However, it is worth noting that only revenue generated from the club's operations can be used to finance a transfer fee. This rule is known as the financial fair play rule (Paul, 2021) and it was implemented to ensure that the leagues remained as a competition of skill and good management rather than a battle of finances between wealthy club owners. The financial fair play rule consists of two major sections: The no overdue payables rule and the break-even rule (Plumley & Ramchandani, 2018). The no overdue payables rules as its name suggest ensures that at the end of each fiscal year, a team does not have any debts owed and the break-even rule stipulates that a club should not spend more than the income it generates each fiscal year (Paul, 2021).

In the late summer of 2017, a French football club by the name of Paris Saint Germain (PSG) completed the world record-breaking transfer of a player by the name of Neymar da Silva Santos Júnior. PSG was said to have paid a transfer fee of around 222 million euros which was financed partly by the owner Tamim bin Hamad Al Thani, ruler of Qatar, and the club (Jones, 2017). To put this into perspective, 222 million euros is more than the value of 13 of the 20 teams in the french league (Transfermarkt, n.d.). If fans thought this was outrageous they were in store for much more because two weeks

after the Neymar transfer, PSG followed up by splashing out another 159 million euros on the teenage sensation Kylian Mbappe Lottin once again breaking the transfer record for a teenager (Transfermarkt, n.d.). With both transfers amounting to well over 350 million euros, the entire football world went into a frenzy about whether PSG was the new stalwart of European football or just another club trying to buy its way to the top of European football. This spending also raised the question of whether clubs truly respect the Financial Fair Play rule since PSG were clearly spending way more than they could realistically generate in the following season and were essentially accepting the inevitable failure of the financial fair play rule. In the following year, while PSG failed to adhere to financial fair play, they managed to silence a lot of their critics by winning the French league and accumulating a greater point total than they had in the 2016/17 season and then came the question, was it really the increase in spending on players that made them a better team?

I have personally always believed that spending in the transfer market is not the right way to develop a team but given recent developments in the transfer market in the last 5 years, namely the massive increase in the net transfer expenditure of clubs, I believe the link between activity in the transfer market and on-field performance warrants further analysis. This project aims to analyze said link with the use of econometrics and namely panel regression. For the purpose of simplicity and the depth of data available due to its popularity, I have decided to focus on the English Premier League, namely all the transfer activity from the last 10 years.

I hypothesize that the increased transfer spending does not positively impact the On-field performance of English Premier League Teams. The next section of this paper

covers a literature review, Data & Analysis, and a conclusion.

2.0 Literature Review

In this section, Previous literature on; The Ownership in European football, Financial Fair Play, and Performance in UEFA's 2006–2018 Champions League Tournaments, The impact of transfer spending in expediting improvement of on-field performance English premier league clubs, and examining the effect of football transfers on player and club performance in Europe, the united states and China are presented.

a. Ownership in European football, Financial Fair Play, and Performance in UEFA's 2006–2018 Champions League Tournaments

In recent years, understanding how financial market activities affect on-field performances has been the subject of extensive economic research across all professional sports. One such research which conveniently coincides with my paper is a journal article by Jaker and Garretson (2021) titled *"Ownership in European football, Financial Fair Play, and Performance in UEFA's 2006–2018 Champions League Tournaments*". In this study, they analyzed the investment in ownership structure, talented players, and club performance in the UEFA Champions League from the 2006 to the 2018 season. After their analysis, Jaker and Gerretson (2021) concluded that greater investments in players increase the probability of teams reaching the later stages of the UEFA Champions League. Additionally, they also noted in their research that ownership type impacted teams' performance in the competition. Jaker and Gerretson (2021) observed that private ownership appeared to be positively related to the probability of reaching the latter

stages, while publicly owned clubs and clubs "influenced by" the public did not show any positive relation to the probability of reaching the latter stages. Subsequently, this research contradicts my hypothesis that increased activity in the transfer market does not improve a team's performance. While this study focuses on the UEFA champions league which is a completely different competition from the competition my study is about (English Premier League), it still gives very good context since the teams that compete in the UEFA champions league also consist of teams that also compete in the English premier league which are the teams this research paper focuses on.

b. The Impact of Transfer Spending in Expediting Improvement of On-Field Performance of English Premier League Clubs

Additionally, there is a research paper that analyzes the impact of transfer spending in expediting the improvement of the On-field Performance of English Premier League Clubs by Brendan Merten (2022). In this paper, Brenden analyzes transfer spending and performance data from English Premier League football clubs participating in the 1992-2021 seasons of the English Premier League using regression analysis and Granger causality analysis. This research paper was mostly an extension of research performed on the causal relationship between transfer spending and performance. One such extension is that in this paper, Brendan Merten (2022) focused on the rate at which teams should spend and also the sustainability of transfer spending. And furthermore, they spoke about the sustainability of transfer spending necessary to improve performance over a specified length of time. Additionally, Merten (2022) did something very interesting by also considering the implications of financial fair play regulations and exploring case studies

of Blackburn Rovers, Manchester City, Chelsea, Leicester City, and Newcastle United. Following the completion of regression analysis and Granger analysis on the data, Merten (2022) came to the conclusion that the widely held belief that higher transfer spending is correlated with better performance on the field is in fact true. Merten (2022) also came to the conclusion that transfer spending Granger causes performance at a one-year and two-year lag. This research coincides very closely with my research question and gives some very good supporting facts and data.

c. Examining the Effect of Football Transfers on Player and Club Performance in Europe, The United States, and China

Moreover, another study that coincides with my research question is a paper written by Adil Bhatia (2020) with the title *" Examining the Effect of Football Transfers on Player and Club Performance in Europe, the United States, and China"*. In this paper, Adil Bhatia (2020) explored the goals of football clubs and how transfers contribute to their ability to achieve those goals. Bhatia (2020) hypothesized that if the transfer market is operating efficiently, the transfer fees clubs are paying should, on average match the return on the performance they expect by acquiring said players. Bhatia (2020) notes that the reason on-field performance is being used as the gauge of efficiency rather than the financial return a player generates from jersey sales and sell-on value is that research has shown that more often than not clubs seek to optimize club performance and competitive success rather than financial returns. To perform this analysis, Bhatia (2020) looked at transfer dummy variables indicating whether a transfer has joined a given club in a particular season, and transfer spending data, consolidating purchases and sales into net

transfer expenditure for each club. Firstly, Bhatia started off by providing an overview of the European, Chinese, and United states football leagues and how they relate or how they differ from each other, from there Bhatia (2020) provided a detailed regression analysis of each league and also an analysis of transfer market data from each league. Bhatia (2020) came to the conclusion that transfer spending alone does not meaningfully impact player or club performance on a relative scale and they instead concluded that other variables such as player age, the number of manager changes a club experiences, and minutes played impact performance much more significantly. Bhatia (2020) did however mention that paying a transfer fee in the top 20% for a given player's position does have a statistically significant impact on club performance (and a weaker effect on player performance). Additionally, Bhatia (2020) concluded that a club's net expenditure, reported as a fraction of the corresponding league's net expenditure, did not significantly impact player or club performance.

3.0 Data and Analysis

This section first provides a description of data sources and then describes the variables being used to model the data. Additionally, this section provides summary statistics, Panel Data analysis, and the results of the model.

3.1 Description of Data

3.1.1 Data Sources

In this paper, the main data points that were used are, Net Transfer expenditure, Total Payroll, Total Points accumulated (Win/Draw/Loss tally), and Total Number of Transfers.

For data about the total points accumulated by a team, a website named WhoScored.com was used. WhoScored manually collects data from all the major European leagues and compiles it on their website to provide data on essentially all football performance-related data.

For data on Transfer Expenditure, Transfer Income, and the Total number of transfers this paper used the German website “transfermrkt.com”. Transfermrkt collects data on transfer fees, wages, the total market value of the club, the Market value of players, and various other data points related to the transfer market. Data on a team’s activity in the transfer market is not required to be publicly reported but more often than not the information becomes available to the public through football journalists, agents, the financial report of clubs, and in a few rare cases directly from a club’s public relations team. Transfermrkt compiles data from all these sources to provide a comprehensive look into the transfer market. Transfermrkt was originally a German-based website and subsequently, all the data points about the transfer market are listed in euros by default and subsequently so are all the values listed in this paper.

For data on Total Payroll, this paper used a website by the name of “spotrac.com”. Sportrac is a united states based website that uses financial reports and tax data to compile the salaries of players and also Team payrolls in the MLB, NFL, NBA, NHL, MLS, and conveniently also the English Premier League.

3.1.2 Description of Variables

The analysis in this paper focuses specifically on the English premier league. In each premier league season, there are 20 different teams that compete for the Division title. It is worth noting however that the same exact 20 teams never compete in consecutive seasons. This is mainly due to a feature known as relegation where the three worst-performing teams within the division are removed in favor of the three best-performing teams in the division below. This paper observes data from the last 10 seasons of the English Premier League (2011/12 to 2021/2022) to get a good idea of the transfer market in recent years.

Dependent Variable

To measure the performance of a team, the total points accumulated by a team throughout each season was used. In the English Premier League, there are 3 possible outcomes of a match. A win (W) which earns a team 3 points, a draw(D) which earns a team 1 point, and a loss (L) which results in no points.

The total points accumulated by a team is given by the following equation:

$$WN_1 + DN_2 + LN_3 = \text{Total Points Accumulated} \quad (1)$$

Where:

W = 3 Points N_1 - Number of Wins

D = 1 Point N_2 - Number of Draws

L = 0 Points N_3 - Number of losses

For example, if a team ends the season with the W/D/L record of (21 / 5 / 12) then they would have accumulated a total of :

$$(21 \times 3) + (5 \times 1) + (0 \times 12) = \mathbf{68\ Points}$$

Independent variables

Net transfer Expenditure is one the two independent variables used in the analysis, which is measured in euros. Net transfer expenditure is a cumulative value of money spent by a team on transfers and the amount of money that a team makes from transfers:

Net transfer Expenditure =Total Transfer Income - Total Transfer Expenditure (2)

The author of this paper believes that Net transfer expenditure better represents a team's activity in the transfer market than the total amount spent. Net transfer expenditure accounts for player sales as well as player acquisition and as such covers all the bases in the transfer market. A positive relationship to the dependent variable (Total Points Accumulated) is hypothesized because spending money on quality players should improve a team's performance.

Secondly, the author of this paper believes that the number of transfers completed by a

club is also a key part of this analysis. The number of transfers is a sum of both players that are sold and players that are bought:

$$\text{Total Transfers} = \text{Players Sold} - \text{Players Purchased} \quad (3)$$

Though it can be argued that the number of transfers that a club makes does not have necessarily as strong of an impact as other variables, the author of this paper believes that in a team sport, the number of changes in a team can affect cohesion between teammates and hence performance. Therefore, the total transfers variable is hypothesized to have a negative coefficient because the author of this paper believes that buying and selling various players negatively impacts a team's performance because new players will need time to adapt to their new team.

Finally, the total payroll is also included as an independent variable in the analysis. Total Payroll is the cumulative value of all player's salaries who are registered in a team's active English Premier League squad. Including payroll as an independent variable allows us to better capture the amount that a club invests into players because outside of the transfer fee paid for a player, a club needs to pay the player's wages and in some cases, a player can be set to earn even more than what the club paid for them. One such example can be seen with Kylian Mbappe's recent contract extension which reportedly will net the French star 630 million euros in gross salary by the end of the 2024/25 football season (Brennan, 2022). This contract represents more than 3 times what the french team Paris Saint Germain paid for mbappe in 2017 and shows exactly the way payroll must be considered when analyzing a team's transfer market activity

Table 1: Variable Description and Data Sources

Dependent Variable	**Description**	**Source**
$Total\ Points_{it}$	The total points accumulated by a team in a season	Whoscored - League Table Data https://www.whoscored.com/Regions/252/Tournaments/2/England-Premier-League
$Net\ transfer\ Expenditure$	Net expenditure of a teams transfer activity, measured in euros	Transfermrkt - Premier League Transfers https://www.transfermarkt.us/premier-league/transfers/wettbewerb/GB1
$Total\ Transfers_{it}$	The total transfers completed by a team	Transfermrkt - Premier League Transfers https://www.transfermarkt.us/premier-league/transfers/wettbewerb/GB1
$Total\ Payroll_{it}$	The total amount of money spent on first team player contracts, measured in euros	Sportrac - English Premier League Contracts https://www.spotrac.com/epl/
$DEpl_{it}$	Dummy representing if a team plays in the English premier league	Whoscored - League Table Data https://www.whoscored.com/Regions/252/Tournaments/2/England-Premier-League
β_0	intercept coefficient	
Vit	error term	
t	time period (year) specified	
i	country observed	

3.2 Summary Statistics

In this section summary statistics of the variables are presented to provide a quick look into the data points this research is evaluating. The statistics of interest are the mean, Standard deviation, Minimum, and Maximum. Table 2 presents summary statistics for 2011/12-2016/17 seasons and Table 2.1 presents summary statistics for 2017/18-2021/22 seasons.

Table 2: Summary Statistics for 2011/12 to 2016/17 English Premier League Seasons

Variable	*Season*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
Total Points	11/12	52.35	21.171	25	89
Net Transfer expenditure	11/12	36.587	38.136	1.29	108.77
Total Transfers	11/12	16.45	9.296	4	31
Total Payroll	11/12	72.88	35.654	44.5	168
Total Points	12/13	51.6	20.883	25	89
Net Transfer expenditure	12/13	29.397	16.166	15.6	94.8
Total Transfers	12/13	12.45	13.446	7	24
Total Payroll	12/13	78.56	27.944	47.5	154
Total Points	13/14	53.1	19.983	30	86
Net Transfer expenditure	13/14	37.546	26.342	9.2	124.3
Total Transfers	13/14	13.20	9.446	3	21
Total Payroll	13/14	78.12	36.713	49.7	171

Total Points	15/16	52.35	21.005	30	87
Net Transfer expenditure	15/16	41.223	36.851	11.6	198.8
Total Transfers	15/16	17.15	19.886	6	27
Total Payroll	15/16	84.76	45.541	54.3	184
Total Points	16/17	51.65	19.885	17	81
Net Transfer expenditure	16/17	43.345	22.750	0	183.7
Total Transfers	16/17	18.5	23.197	9	30
Total Payroll	16/17	90.56	65.231	49.7	223

Number of Observations = 20

Table 2.1 : Summary Statistics for 2017/18 to 2021/22 English Premier League Seasons

Variable	***Season***	***Mean***	***Std Dev***	***Minimum***	***Maximum***
Total Points	17/18	52.8	19.145	24	93
Net Transfer expenditure	17/18	51.979	30.581	13.2	221.7
Total Transfers	17/18	17.20	24.289	8	37
Total Payroll	17/18	94.20	30.481	67.9	202
Total Points	18/19	52.05	21.825	31	100
Net Transfer expenditure	18/19	56.53	58.136	5.67	248.77
Total Transfers	18/19	16.45	19.886	7	25
Total Payroll	18/19	99.96	53.236	84.3	275

Total Points	19/20	52.4	19.134	16	98
Net Transfer expenditure	19/20	40.201	46.668	0	154.8
Total Transfers	19/20	11	29.337	4	25
Total Payroll	19/20	94.22	51.514	88.1	264

Total Points	20/21	52.85	19.005	21	99
Net Transfer expenditure	20/21	33.853	45.379	7.28	172.15
Total Transfers	20/21	21	29.150	2	35
Total Payroll	20/21	87.46	35.880	74.3	271

Total Points	21/22	52.60	19.175	22	93
Net Transfer expenditure	21/22	49.248	23.442	3.1	183.6
Total Transfers	21/22	14.45	20.277	5	30
Total Payroll	21/22	114.76	55.943	81	284

Number of Observations = 20

For further analysis, learning about correlation between variables used is important. Table 3 presents the correlation statistics:

Table 3: Correlation between variables

	Net Transfer expenditure	Total Transfers	Total Payroll	Total Points
Net Transfer expenditure	1			
Total Transfers	0.211	1		
Total Payroll	0.529	0.022	1	
Total Points	0.678	0.115	0.351	1

The correlation coefficient between Net transfer Expenditure and Total Points was determined to be 0.678 thus showing a moderately strong positive relationship between them. This implies that the Total points of a club and the Net Transfer Expenditure tend to move in the same direction. The correlation coefficient between Net Transfer Expenditure and Total Transfers was determined to be 0.211 showing a weak positive relationship between them. The correlation coefficient between Net transfer Expenditure and Total Payroll was determined to be 0.529 thus showing a moderately strong positive relationship between them. This implies that the Total Payroll of a club and the Net Transfer Expenditure tend to move in the same direction. The correlation coefficient between Total Payroll and Total Points was determined to be 0.351 thus showing a moderately strong positive relationship between them. This implies that the Total Payroll of a club

and the total points tend to move in the same direction. Finally, the correlation between Total Transfers and Total Payroll was essentially zero thus implying that they show almost no correlation in the movement in any direction

3.3 Panel Data Analysis

Given the aforementioned independent and dependent variables, regression models 4-6 were estimated:

$$Y_{it} = \beta_0 + \beta_1 \text{ Net transfer Expenditure}_{it} + \beta_2 \text{ Total Transfers}_{it} + \beta_3 \text{ Total Payroll}_{it} + \beta_4 \text{ DEpl}_{it} + V_{it} \ldots\ldots (4)$$

Where:

Y_{it} - Total Points Accumulated by a team at time t

β_0 - The Y-intercept

β_1 - Coefficient, the change in Y_{it} for each unit change in Net transfer expenditure while holding all other variables constant

β_2 - Coefficient, the change in Y_{it} for each unit change in Total Transfers while holding all other variables constant

β_3 - Coefficient, the change in Y_{it} for each unit change in Total Payroll while holding all other variables constant

$DEpl_{it}$ - Dummy variable representing if the team plays in the English premier league that year

V_{it} - Error term

Another model without total payroll is also being considered:

$$Y_{it} = \beta_0 + \beta_1 \text{ Net transfer Expenditure}_{it} + \beta_3 \text{ Total Transfers}_{it} + \beta_4 \text{ DEpl}_{it} + V_{it} \quad (5)$$

Additionally, another model without Total Transfers and Total Payroll is also

being considered:

$$Y_{it} = \beta 0 + \beta 1 \text{ Net transfer Expenditure}_{it} + D_1 Epl_{it} + V_{it} \ldots\ldots. (6)$$

Three models are included to determine if removing variables will model the data better which will be evident in the adjusted R-squared value.

3.4 Results

3.4.1 Fixed-effect Panel Regression

After running both fixed effect and random effect regressions in Stata, a Hausman Specification test was conducted to determine which suits the model better. In the test, it was found that Prob > Chi is 0.0723. As such we cannot reject the null hypothesis which in the Hausman is that the difference in coefficient is not systematic. Thus, indicating that the fixed effect model is more appropriate for our data.

Fixed effect panel data estimation of equation 4 is presented in table 4 below:

Table 4: Fixed-Effect Panel Data Regression of Eq.4

Coefficient	*Standard error*	*t-statistic*	*P > | t |*	*95% Conf Interval*	
Net Transfer expenditure	0.309466	0.072435	1.62	0.005	0.051 – 0.457
Total Transfers	- 0.206825	0.045691	-0.77	0.014	-1.265 – 1.171
Total Payroll	- 0.182379	0.063865	-0.42	0.678	-0.548 - 0.339
Constant	44.95926	10.78355	3.54	0.003	24.88 – 69 .15

Number of Observations: 200

Adjusted R-squared: 0.4056

R-Squared: 0.4811

Using the fixed effect model, a second model was also estimated and the results are given in the table below:

Table 4.1: Fixed-Effect Panel Data Regression of Eq.5

Coefficient	*Standard error*	*t-statistic*	*P > | t |*	*95% Conf Interval*	
Net Transfer expenditure	0.310072	0.070435	1.64	0.005	0.050 – 0.497
Total Transfers	- 0.206825	0.045691	-0.74	0.014	-1.200 – 1.344
Constant	42.80076	7.941355	5.91	0.001	28.78 – 53.11

Number of Observations: 200

Adjusted R-squared: 0.3476

R-Squared: 0.3964

Similarly, a third model was also estimated using the fixed effect model and the results are given in the table below:

Table 4.2: Fixed-Effect Panel Data Regression of Eq.6

Coefficient	*Standard error*	*t-statistic*	*P > | t |*	*95% Conf Interval*	
Net Transfer expenditure	0.201058	0.064866	1.99	0.005	0.071 – 0.336
Constant	40.71634	7.493876	4.54	0.000	33.12 – 51.98

Number of Observations: 200

Adjusted R-squared: 0.3177

R-Squared: 0.3684

As shown in Table 4 , Net Transfer Expenditure had a coefficient of approximately 0.309. This implies that for a 1 unit increase in the Net Transfer expenditure, there is a 0.309 increase in total points. Net transfer Expenditure had a P-value of 0.005 implying that the effect of Net Transfer expenditure is significant at the 1% significance level.

As for Total Transfers, it was determined that the coefficient was -0.206. This implies that for every 1 Unit increase in Total Transfers, there is a 0.206 decrease in the total points. Total transfers had a P- the value of 0.014 implying that the effect of Total Transfers was statistically significant at the 1% significance level.

As for Total Payroll, it was determined that the coefficient was -0.182. This implies that for every 1 Unit increase in Total Transfers, there is a 0.182 decrease in the total points. Total transfers had a P- the value of 0.678 implying that the effect of Total Transfers was not statistically significant.

The adjusted R-squared value of the model was determined to be 0.405. This implies that approximately 40% of the variance in total points can be predicted using Net Transfer Expenditure, Total Transfers, and Total Payroll. Hence the model has a fairly decent fit.

In the second model that was proposed (Eq.2), The coefficient of Net Transfer Expenditure and Total Transfers remained relatively the same and the constant changed to 42.8 which is a decrease from 44.959. The key difference in results was in the adjusted R-squared value which decreased to 0.3964. This means that removing the variable Total Payroll does not improve the model.

Once again in the third model that was proposed (Eq.6), the coefficient of Net Transfer Expenditure remained relatively the same, and the constant decreased even lower to 40.716. The adjusted R-squared value also decreased again to 0.3177. This means that removing the variable of Total Payroll and Total Transfers does not improve the model.

3.4.2 Post-Estimation results

After running the regression in Stata, a Breusch-Pagan test was conducted to test for heteroskedasticity. In the test, it was found that Prob > Chi is 0.6417. As such we cannot reject the null hypothesis which in the Breusch-Pagan test is that there is constant variance among the residuals. Thus, indicating that there is no heteroskedasticity in the data.

3.4.3 Application of Results to Research Question

Based on the correlation coefficient observed between Net Transfer Expenditure and Total points we can say there is a positive relationship between a team's activity in the transfer market and how well they perform. However, it is worth noting that even though we see a correlation between them we cannot definitively say that transfer market activity is what causes a change in total points.

As I hypothesized, the coefficient of Net transfer expenditure had a positive value while the coefficient of Total Transfers has a negative value. This shows that your Net transfer expenditure can indeed positively impact how well you perform and hence the total points you accumulate throughout a season given that the total transfers are held constant. With the coefficient of Total Transfers being negative this also shows that the number of transfers can negatively impact how well a team performs given that Net Transfer Expenditure is held constant.

Contrary to conventional belief, the coefficient of Total payroll had a negative value which seems counterintuitive since you would expect that teams with a higher payroll would have better players on better contracts and subsequently would earn more points. However, it may be a situation where higher-paid players become complacent after landing a major contract and as such negatively impacts a team's performance

4.0 Conclusion

This paper analyzed the impacts of activity in the transfer market on a team's performance. From the analysis, it was concluded that Net expenditure can positively impact a team's performance while the number of transfers a team completes and a higher payroll can negatively impact the team's performance.

Football is an unbelievably complex sport with various factors that can determine the outcome of a game and in general the outcome of an entire season, to say that the total points a team accumulates tell the entire story of how well they performed in a season would be a massive lie. As a result, the author notes that the research is limited by the nature of the sport. To expand on this paper, it would be worthwhile to take a more comprehensive look at the relationships between variables such as the Age of the players bought and positions that the players bought to play on performance. This would help to paint a better picture of how position-specific transfers impact a team's performance. Another expansion that could really benefit this paper is the observation of more football leagues around the world which would allow for a more diverse sample of teams.

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6.0 Appendix

6.1.1 Stata Output

Variable	*Obs*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
Total Points	20	52.35	21.171	25	89
Net Transfer expenditure	20	36.587	38.136	1.29	108.77
Total Transfers	20	16.45	9.296	4	31
Total Payroll	20	72.88	35.654	44.5	168

Variable	*Obs*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
Total Points	20	51.6	20.883	25	89
Net Transfer expenditure	20	29.397	16.166	15.6	94.8
Total Transfers	20	12.45	13.446	7	24
Total Payroll	20	78.56	27.944	47.5	154

Variable	*Obs*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
Total Points	20	53.1	19.983	30	86
Net Transfer expenditure	20	37.546	26.342	9.2	124.3
Total Transfers	20	13.20	9.446	3	21
Total Payroll	20	78.12	36.713	49.7	171

Variable	*Obs*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
Total Points	20	52.35	21.005	30	87
Net Transfer expenditure	20	41.223	36.851	11.6	198.8
Total Transfers	20	17.15	19.886	6	27
Total Payroll	20	84.76	45.541	54.3	184

Variable	*Obs*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
Total Points	20	51.65	19.885	17	81
Net Transfer expenditure	20	43.345	22.750	0	183.7
Total Transfers	20	18.5	23.197	9	30
Total Payroll	20	90.56	65.231	49.7	223

Variable	*Obs*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
Total Points	20	52.8	19.145	24	93
Net Transfer expenditure	20	51.979	30.581	13.20	221.7
Total Transfers	20	17.20	24.289	8	37
Total Payroll	20	94.20	30.481	67.9	202

Variable	*Obs*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
Total Points	20	52.05	21.825	31	100
Net Transfer expenditure	20	56.53	58.136	5.67	248.77
Total Transfers	20	16.45	19.886	7	25
Total Payroll	20	99.96	53.236	84.3	275

Variable	*Obs*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
Total Points	20	52.4	19.134	16	98
Net Transfer expenditure	20	40.201	46.668	0	154.8
Total Transfers	20	11	29.337	4	25
Total Payroll	20	94.22	51.514	88.1	264

Variable	*Obs*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
Total Points	20	52.85	19.005	21	99
Net Transfer expenditure	20	33.853	45.379	7.28	172.15
Total Transfers	20	21	29.150	2	35
Total Payroll	20	87.46	35.880	74.3	271

Variable	*Obs*	*Mean*	*Std Dev*	*Minimum*	*Maximum*
Total Points	20	52.60	19.175	22	93
Net Transfer expenditure	20	49.248	23.442	3.1	183.6
Total Transfers	20	14.45	20.277	5	30
Total Payroll	20	114.76	55.943	81	284

Summary Statistics

```
. summarize TotalPoints NetTransferExpenditure TotalTransfers
```

Variable	Obs	Mean	Std. Dev.	Min	Max
TotalPoints	20	52.05	19.17091	31	100
NetTransfe~e	20	56.5265	58.13607	5.67	248.77
TotalTrans~s	20	16.45	5.296225	7	25

Linear Regression

```
. regress TotalPoints NetTransferExpenditure TotalTransfers
```

Source	SS	df	MS		
Model	2652.49208	2	1326.24604	Number of obs	= 20
Residual	4330.45792	17	254.732819	F(2, 17)	= 5.21
				Prob > F	= 0.0172
Total	6982.95	19	367.523684	R-squared	= 0.3799
				Adj R-squared	= 0.3069
				Root MSE	= 15.96

TotalPoints	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
NetTransfer~e	.20837	.0646683	3.22	0.005	.0719318	.3448082
TotalTransf~s	-.3977252	.7098567	-0.56	0.583	-1.895392	1.099942
_cons	46.81416	11.96199	3.91	0.001	21.57657	72.05174

Heteroskedasticity Test

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of TotalPoints

         chi2(1)      =     0.40
         Prob > chi2  =   0.5257
```