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The relationship between the wage bill of the football clubs and their probability of being champion in their national leagues.

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Abstract

This paper aims to find what type of relationship exists between the wage bill of 20 football clubs and the probability of winning the national championship in six of the major European Leagues (Portuguese, Spanish, Italian, French, German and English). In this work, I will use four econometric regressions to study how the wage component could influence the number of points and the probability of succeed in the national championship on each of the six studied leagues. Results show that the salary components influence positively the results of teams and this positive influence remains across all the leagues. The number of points that each team achieves in the end of the season is influenced by their salary and the wage difference between each club and the club with the highest payroll in each season. Finally, the wage bill and the wage difference of the clubs are individually significant to explain the probability of succeed nationally.

Keywords: Football, wage bill, wage difference, number of points, national championship, European Leagues.

Resumo

O objectivo deste trabalho é descobrir que tipo de relação existe entre os salários de 20 clubes de futebol e a probalidade de ganharem o campeonato nacional nas seis maiores Ligas Europeias (Portuguesa, Espanhola, Italiana, Francesa, Alemã e Inglesa). Neste trabalho utilizo seis regressões econométricas para estudar como é que as componentes salariais podem influenciar o número de pontos e a probabilidade de sucesso no campeonato nacional em cada uma das seis ligas estudadas. Os resultados mostram que os salários influenciam positivamente os resultados desportivos das equipas e essa influência positiva acontece em todas as ligas. O número de pontos atingido por cada clube no final da temporada é influenciado pelo salário e pela diferença salarial entre cada um dos clubes e o clube com a maior folha salarial em cada época. Finalmente, os salários e a diferença salarial dos clubes são individualmente significativas para explicar o sucesso nacional de cada clube.

Palavras-chave: Futebol, salário, diferença salarial, número de pontos, campeonato nacional, Ligas Europeias.

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1 Introduction

Football is one of the most visible economic activities in the world but it is not yet totally studied from the economic point of view. It is very difficult to conduct economic and econometric researches in the world of football because the majority of the phenomena cannot be explained based only on numbers and econometric work. Qualitative reasons, deeper knowledge of the right professionals, in complement to economics factors, are the better solution to view and understand this amazing world. There are still few economic/econometric researches in this area, and so my goal is to help understanding a little bit better why some phenomena happen.

This work can be interesting for academic researchers of the sports area, in order to have some knowledge about this subject, get deeper conclusions about this topic, and try to understand why some clubs, who are rivals in the competition for titles, win and earn more than their direct competitors. Besides that, it would also be important for the football clubs to really understand the weight that their wage bill, with athletes and technical staff, has in increasing the probabilities of success in the national championships.

Why is the wage bill important? Because better players and managers earn bigger wages, so the size of the wage bill in each club reflects the quality of the players and technical staff in the squad. The higher the wage bill the more talented players and managers exist in the club and so the better and more competitive the club can be.

With this in mind, the main objective of this thesis is really trying to understand if there is indeed some type of relationship between the wage bill of the football clubs and their possibility of success in their respective national championships compared with their rivals. In order to achieve this goal, I will try to answer to the following questions: **1)** Does the salary component influence the results of the team? **2)** If that influence exists, does it differ from club to club and from league to league? **3)** The wage bill of clubs has some type of influence in the number of points that each club obtain in the end of the season? **4)** Is the number of points influenced by the wage difference between the clubs? **5)** Are the wage bill and wage difference significant variables to explain the probability of the club to win the national league?

In order to conduct this work, I will use secondary data taken from the annual reports and financial statements from each club, reports from the UEFA, Money Leagues reports from Deloitte, also some information of the sports site “Total Sportek” and from the site “Statistica”.

With this data I will use Stata to study, with four econometric regressions, how the wage component could influence the variables number of points and the probability of winning the national championship in each of the six leagues studied.

To conclude, my thesis will be organized in the following way: In the first part of the work I will present the literature review and the methodology and data collection. In the next chapter I will analyse in more detail each one of the chosen European Football Leagues (Portuguese, Spanish, French, German, English and Italian). I will present a brief explanation why some clubs are not analysed, although they were national champions during the ten years of the sample. Next, I will present a small introduction about each club, some of their history and most important titles, both nationally and internationally, a short analysis of their salary and points evolution, their presence in the group stage of Champions League, the number of national championships won and the results for each of the leagues. In the next chapter, I will present the general results and finally, I will have a last conclusion of the overall work.

2 Literature Review

2.1 Pay and Performance

In the English Soccer there are four main football divisions: Premier League, Football League First Division, Football League Second Division and Football League Third Division, with a total of 92 clubs participating in all of them. Across all the leagues there is a system of relegation of the three worst teams of each league, which are replaced for the best three teams from the league immediately below. This allowed Hall, Szymanski and Zimbalist (2002, p.152, 153 and 154) to conclude that, in English soccer, there is a high degree of mobility between leagues when compared to other countries and sports. This led these authors to conclude that they could not study only one league (Premier League) in isolation. They created a sample of 39 clubs that had been represented in the leagues for 26 years (1973-1999) which was representative of the total number of clubs in all leagues analysed. These authors made a comparison between football and baseball, having concluded that the correlation between performance, player spending and payroll is much stronger for football than for baseball.

"…, the overall correlation between performance and player spending seems much stronger for English soccer than for baseball, as indicated by the R^2 of 0.74. When we look at the relationship between payroll and success during 26 years for each club on average (see Figure 4), we similarly find a much closer correlation than we do in baseball." (Hall, Szymanski & Zimbalist, 2002, p.154)

They also concluded that there is more variation in success and payroll in soccer than in baseball, meaning that the standard deviation of the payments in football is higher than in baseball. The differences in the performance of the teams is also bigger in the football than in baseball because the number of clubs is higher in the first than in the second. Finally, they remarked that the club's performance at the top level of football is more responsive to expenditures than the teams at the top level of baseball (Hall, Szymanski & Zimbalist, 2002, p.154 and 157).

2.2 Competitive Balance

Competitive balance (CB) expresses the uncertainty of the results of the professional sports events. It plays a crucial role in the world of sports today, and it is a very important component to the success of the clubs and so each team has all the interest that their direct rivals are the healthiest possible (Humphreys, 2002, p.133).

> "A certain degree of CB is often seen as a key component to success of sports leagues and therefore each competitor has an inherent interest in maintaining the health of their rivals." (Pawlowski, Breuer & Hovemann, 2010, p.188)

We can divide the term competitive balance into a two different components: first, a within-season component that points out the main differences in performance of the clubs of a league during a season, and a second one, a within-team component, that can explain the behaviour of a club during a period of time (Pawlowski, Breuer & Hovemann, 2010, p.188).

A big argument in favour of competitive balance in the leagues is that if the league is very unequal in terms of competition it can generate a decrease in the demand, the fans will be unhappy, the bigger clubs can go to a different league where there is more competition and the smaller clubs will face the risk of relegation and even bankruptcy. The level of competitive balance in the leagues depends also on the dissemination of the best players among the teams and the access of clubs to other sources of revenues, like the Champions League, imply higher success in the domestic leagues. However, there are other factors that affects CB besides higher revenues: different access to technology and public financing, lack of honesty from the clubs, doping, unequal distribution of the revenues from the media, differences in the tax system, among others (Pawlowski, Breuer & Hovemann, 2010, p.188 and 189).

Past studies on this theme expose large differences in CB across the leagues. The main findings come out inconsistent, but these inconsistencies can be attributed to differences in the seasons analysed. Some of them reveal no significant changes in CB, others recognize a decline in CB in some leagues and even others consider the impact of some factors in the CB of the football competitions like the promotion, relegation and score system, the number of opponents and the distribution of the revenues in the leagues (Pawlowski, Breuer & Hovemann, 2010, p.189).

A huge factor that affects negatively the competitive balance of the sports leagues are the changes in the Champions League that occurred in the beginning of the twenty-first century.

Since the beginning of the Champions League (CL), an European competition in which the European clubs participate at the same time that they compete in their national league competitions, many modifications have occurred: the first one, occurred in the season of 1999-2000, was the increase of the number of participants from 24 to 32 teams divided in eight groups of four participants in each one of them; the second one was a huge increase of the payments to the teams that participated in this competition, which allowed them to invest a higher quantity of money in players that were more talented and could help the team reach the success, compared with their rivals in the domestic leagues. This increase in the payments together with other factors, like more media revenues in the domestic leagues, higher number of investors entry in the clubs and continuous appearances of the clubs in the European competitions have had a huge impact on the competitive balance of the national leagues, making them less competitive (Pawlowski, Breuer & Hovemann, 2010, p.187).

This adjustment in the Champions League payments plays a crucial role in the decrease of the Competitive Balance of the Leagues. This impact could become more powerful in the near future, because the TV earnings that come from the CL will increase. However these earnings are not equally distributed across clubs - the most important clubs of the leagues receive the majority of the receipts because they are present in the CL season after season. The constant appearances of these clubs reflect their domination of the domestic leagues, which guarantees them the presence in the CL in the next season. This new way of distributing TV revenues benefits the major clubs because they play in the bigger European leagues, which means that they will continue to receive huge payments even if they do not play well (Pawlowski, Breuer & Hovemann, 2010, p.199).

3 Methodology and Data Collection

For this thesis, I will use secondary data taken from the annual reports and financial statements from each club, reports from the UEFA, Money Leagues reports from Deloitte, also some information of the sports site “Total Sportek” and from the site “Statistica”.

With this data previously collected, I will use Stata to study, with four econometric regressions for each league (except for France), how the wage component could influence the variables number of points and the probability of winning the national championship in each of the six leagues studied. On each regression, I will check for a positive relationship between the variables involved.

In the first two regressions I will use an OLS model. In the last two regressions, I will use a logit model because the probability of each club winning the national championship is a binomial variable, meaning that only takes the value 1 (one) if the club wins the championship in each season, and the value 0 (zero) if the club doesn’t win the national championship in the respective season.

In the first regression, I will use as the dependent variable the number of points of the clubs, and as independent variables the wagebill of the clubs and the number of presences in the group stage of the Champions League.

In the second regression, I will use as the dependent variable the number of points of the clubs and as independent variables the wage difference (between the highest wagebill in the league and the wage bill of each club, in each of the seasons) and the number of presences in the group stage of the Champions League.

In the third regression, I will use as the dependent variable the probability of each cub winning the national championship and as independent variables the wage bill of the clubs and the number of presences in the group stage of the Champions League.

In the fourth regression, I will use as the dependent variable the probability of each club winning the national championship and as independent variables the wage difference (between the highest wagebill in the league and the wage bill of each club, in each of the seasons) and the number of presences in the stage group of the Champions League.

4 The Six European Leagues

In this chapter I will analyse the six most important European Leagues (Portuguese, Spanish, Italian, French, German and English) and 20 clubs of these Leagues (SL Benfica, FC Porto, Sporting Clube de Portugal, FC Barcelona, Real Madrid CF, Club Atlético de Madrid, Juventus, AS Roma, FC Internazionale Milano, AC Milan, Paris Saint-Germain, Olympique Lyonnais, Manchester United FC, Manchester City FC, Liverpool FC, Chelsea FC and Arsenal FC). I chose these leagues and clubs because they are the most important in the European landscape, and because they are the clubs for which the points and salary information is the most reliable and can be arranged for a period of 10 years.

First, I will make a small note why, in the English, French and German leagues, there are some clubs that were champions during the years analysed but will not be addressed in this work. Second, I will make a small introduction about each club, presenting some of their history, most important titles, both nationally and internationally and check for their place in the UEFA clubs ranking. Third, I will make a short analysis of their salary and points evolution, their presence in the group stage of Champions League and the number of national championships won. Finally, I will take the major results for each of the six studied leagues.

In order to present the results, I will construct for each league a table that contains the main coefficients and p-values that came from the different regressions analysed. The values for the variables “Milwagebill”, “Milwagediff” and “Idas à Champions” were taken directly from the outputs of the regressions. They allowed us to take some major conclusions about the coefficients and the individual significance of each variable. In order to be able to check if the models used were globally significant or not, I will check the p-values of the overall models and compared them with the standard global significance value of 5%.

4.1 Portuguese League

4.1.1 SL Benfica

Sport Lisboa e Benfica was founded on 28th of February 1904, by Cosme Damião and has already won many national titles, including 37 Premier League titles, 26 Portuguese cups, 7 Liga cups, 8 Supercups Cândido de Oliveira and 3 Portuguese Championships. Internationally, it has 2 Champions League titles and also a Latin Cup, totalling 84 titles. It currently ranks 20th in the UEFA club ranking.

From the data, we can observe that wages were 37M€ in 2009, increasing 70.11% until 2014 and decreasing 5.66% from 2014 to 2015. From 2015 until 2017 the wages increased 25.32% and from 2017 to 2018, they decreased 9.1%, ending with a value of 68 M€. The average salary is 54 M€ and during these ten years, the club had been national champion five times. Over the past ten years, it achieved an average of 75.4 points, had the highest payroll in two seasons and has been in the Champions League group stage during nine of ten years in current analysis.

4.1.2 FC Porto

Futebol Clube do Porto was founded on 28th of September 1893 and refounded on 2nd of August 1906 by José Monteiro da Costa and already has many national titles, including: 28 Premier League titles, 16 Portuguese Cups, 21 Cândido de Oliveira Supercups and 4 Portuguese Championships. Internationally, is the Portuguese club with more titles in its history, including: 2 Champions Leagues, 2 Europa Leagues, 2 Intercontinental Cups, 1 European Supercup and finally, 1 European Youth League, totalling 77 titles. It currently occupies the 18th position in the UEFA club ranking.

From the data, we can note that wages were 44M€ in 2009, decreasing 19.51% until 2010 and from 2010 until 2011 they increased 40.88%. They decreased 0.94% from 2011 to 2012 and increasing 9.01% from 2012 to 2013. From 2013 until 2014 the wages decreased 9.58% and increased 61.31% from 2014 until 2017. From 2017 to 2018, the wages decreased 0.07%, ending with a value of 79 M€. The average salary is 58 M€ and during the ten years analysed, the club had been national champion five times. Over the past ten years, the club has achieved an average of 75.5 points, had the highest payroll in eight seasons and has been in the Champions League group stage in nine of the ten years analysed.

4.1.3 Sporting Clube de Portugal

Sporting Clube de Portugal is a Portuguese club that was founded on the 1st of July 1906 by the hands of José de Alvalade and is headquartered in Lisbon in the Alvalade XXI complex. It has been national champion of the Portuguese League 18 times, holds 17 Portuguese Cups, 4 Portuguese Championships, 8 Supercups Cândido de Oliveira and 2 League Cups. Internationally, Sporting won the 1963-64 Cup Winner's Cup and was vice Champion in the 2004-05 UEFA Cup, totalling 51 titles. It currently occupies the 30th position in the UEFA club ranking.

From the data, we can view that wages were 24 M€ in 2009, decreasing 2.41% until 2010 and increased 83.66% from 2010 to 2012. From 2012 until 2014 the wages decreased 41.20% and from 2014 until 2018, they increased 195.36%, ending with a value of 74 M€. The average salary is 40 M€ and during the ten years analysed, the club has never been national champion. Over the past ten years, the club has achieved an average of 64 points, has never had the highest salary and has been in the Champions League group stage in three of the ten years analysed.

4.1.4 Portuguese League: Individual Results

Portuguese League	1st Regression	2nd Regression	3rd Regression	4th Regression
	OLS	OLS	Logit	Logit
Milwagebill	0.26	-	0.04	-
P-values	0.027	-	0.148	-
Milwagediff	-	-0.01	-	0.16
P-values	-	0.965	-	0.044
Idas à Champions	-	16.04	-	-
P-values	-	0.001	-	-
Global Significance	0.0001	0.0013	0.1323	0.0063

Table 1: Coefficients from the regressions in the Portuguese League

The variable "Milwagebill" appears in the first and third regressions and in all of them takes positive values: 0.26 and 0.04 respectively. This means that when the salary increases, the number of points and the probability of winning the national championship increases as well, which validates our hypothesis that exists a positive relationship between them. It is an individually significant variable to explain the number of points, as it presents a p-value of 0.027, below the standard significance level of 5%. However it is not an individually significant

variable to explain the probability of winning the national championship, as it presents a p-value of 0.148, above the standard significance level of 5%.

The variable "Milwagediff" appears in the second and fourth regressions, but in the second one it presents a negative coefficient of -0.01 and in the fourth one it presents a positive coefficient of 0.16. This means that when the salary difference increases between each club and the club with the highest payroll in each of the seasons, the number of points decreases but the probability of winning the national championship increases. In the first case, this means that wage differences make it more difficult to get more points, but still it is possible to be a champion, which only validates our hypothesis that exists a positive relationship between these last two of the variables analysed. It is not an individually significant variable to explain the number of points, as it presents a p-value of 0.965, above the standard significance level of 5%. However it is an individually significant variable to explain the probability of winning the national championship, as it presents a p-value of 0.044, below the standard significance level of 5%.

The variable "Idas à Champions" appears in the second regression and it presents a positive coefficient of 16.04. This means that when a club participates in the group stage of the Champions League it increases the probability of getting more points, because the revenues increases and the clubs are stronger and better positioned to fight for the top places in their domestic leagues. This validates our hypothesis that exists a positive relationship between the two variables. It is also an individually significant variable to explain the number of points obtained in the end of the season, because it presents p-values of 0.001, bellow the standard significance level of 5%.

We can check for global significance of each of the models used by looking for the p-values in each of the four regressions. As the p-values of the first, second and fourth models are lower than the standard significance level of 5%, we can state that the models mentioned above are globally significant. However, as the p-value of the third model is 0.1323, higher than the standard significance level of 5%, we can conclude that this model is not globally significant.

4.2 Spanish League

4.2.1 FC Barcelona

Futbol Club Barcelona is a Spanish club founded on 29th of November 1899 by a group of Swiss, English and Catalan footballers and has a big number of national titles in its history: 26 La Liga titles, 30 del Rey cups, 13 Supercups from Spain, 2 League Cups and 3 Eva Duarte cups. Internationally, already holds 3 World Championships, 5 Champions League, 4 Cup Winner's Cup and 5 UEFA Supercups, totalling 91 titles. It currently occupies the 2nd position in the UEFA club ranking.

From the data, we can observe that wages were 173 M€ in 2009 and increased 19.07% until 2011. From 2011 to 2012 they decreased 3.20% and increased 143.59% from 2012 to 2018, ending with a value of 486 M€. The average salary is 267 M€ and during these analysed ten years, the club has been national champion seven times. Over the past ten years, it achieved an average of 92.8 points, had the highest payroll in three seasons and has been in the Champions League group stage in all the seasons analysed.

4.2.2 Real Madrid CF

Real Madrid Club de Fútbol is a Spanish club officially founded on 6th of March 1902 by brothers Juan Padrós and Carlos Padrós under the name Madrid Foot-Ball Club in Madrid. During these years it has collected several achievements including: 33 La Liga titles, 19 del Rey cup titles, 10 Spanish Supercup titles, 1 Spanish League cup title and 1 Eva Duarte cup title. It is the club with the most titles at the international level: 13 Champions League title (the biggest champion of the tournament), 2 Europa League titles, 4 UEFA Supercup titles, 4 Club World Championships titles and 3 Intercontinental Cup titles, totalling 90 titles. The club currently leads the UEFA ranking.

From the data, we can note that wages were 249 M€ in 2009 and increased 25.87% until 2012. From 2012 to 2013, the wages decreased 33.64% and increased 106.20% from 2013 to 2018, ending with a value of 428 M€. The average salary is 302 M€ and during the ten years analysed, the club has been national champion two times. Over the past ten years, the club has achieved an average of 88.9 points, had the highest payroll in seven seasons and has been in the Champions League group stage in all the years analysed.

4.2.3 Club Atlético de Madrid

Club Atlético de Madrid is a Spanish club, based in the city of Madrid, founded on 26th of April 1903 by fellow Basque students from Atlético Bilbao. It is the third most successful club in Spanish football with 10 La Liga titles, 10 cups del Rey titles, 2 Spanish Supercup titles and 1 Eva Duarte cup title. Internationally they have won Europa League 3 times, the UEFA Supercup 3 times, 1 Cup Winner's Cup and 1 International Cup, totalling 30 titles. It currently occupies the 4th position in the UEFA club ranking.

From the data, we can view that wages were 68 M€ in 2009 and decreased 8.89% until 2010, increased 23.49% from 2010 to 2011 and decreased 19.76% until 2012. From 2012 until 2014 the wages increased 85.43%, decreased 9.79% from 2014 to 2015 and increased 104.14% from 2015 until 2018, ending with a value of 208 M€. The average salary is 107 M€ and during the ten years analysed, the club has been national champion once. Over the past ten years, the club has achieved an average of 71.7 points, has never had the highest payroll and has been in the Champions League group stage in seven of the ten years analysed.

4.2.4 Spanish League: Individual Results

Spanish League	1st Regression	2nd Regression	3rd Regression	4th Regression
	OLS	OLS	Logit	Logit
Milwagebill	0.03	-	0.01	-
P-values	0.038	-	0.098	-
Milwagediff	-	0.06	-	0.01
P-values	-	0.002	-	0.054
Idas à Champions	-	26.00	-	-
P-values	-	0.000	-	-
Global Significance	0.0000	0.0000	0.0784	0.0237

Table 2: Coefficients from the regressions in the Spanish League

The variable "Milwagebill" appears in the first and third regressions and in both of them takes positive values: 0.03 and 0.01 respectively. This means that when the wage bill increases, the number of points and the probability of winning the national championship increases as well, which validates our hypothesis that exists a positive relationship between them, although the numbers are very small, which means the impact of wages is small. This variable is also individually significant to explain the number of points and the probability of winning the

national championship, as it presents p-values of 0.038 and 0.098, below the significance level of 10%.

The variable "Milwagediff" appears in the second and fourth regressions and in both of them takes positive values: 0.06 and 0.01 respectively. This means that when the salary difference increases between each club and the club with the highest payroll in each season, the number of points and the probability of winning the national championship of the clubs increases as well but very little, which means that wage differences are not very relevant because the numbers are very small. This variable is also individually significant to explain the number of points and the probability of winning the national championship, as it presents p-values of 0.002 and 0.054, below the significance level of 10%.

The variable "Idas à Champions" appears in the second regression and it presents a positive coefficient of 26.00. This means that when a club participates in the group stage of the Champions League it increases the probability of getting more points, because the revenues increases and the clubs are stronger and better positioned to fight for the top places in their domestic leagues. This validates our hypothesis that exists a positive relationship between the two variables. It is also an individually significant variable to explain the number of points obtained in the end of the season, because it presents p-values of 0.000, bellow the standard significance level of 5%.

We can check for global significance of each of the models used by looking for the p-values in each of the four regressions. As the p-values of all the models are all lower than the significance level of 10%, we can state that all the presented models are globally significant.

4.3 Italian League

4.3.1 Juventus

Juventus Football Club is an Italian club based in Turin, founded on the 1st of November 1897 with the name of Sport Club Juventus by students of Massimo D'Azeglio Lyceum, but two years later was renamed Foot-Ball Club Juventus. At the national level, it has already won many titles in its history: 35 Italian Championships, 13 Italian Cups, 8 Italian Supercups and 1 Italian Championship (Serie B). At international and world level, it has already collected a respected number of titles, including: 2 Champions Leagues, 3 Europe Leagues, 1 Cup Winners Cup, 2 UEFA Supercups and 1 UEFA Intertoto Cup, totalling 66 titles. It currently occupies the 5th position in the UEFA club ranking.

From the data, we can observe that wages were 129 M€ in 2009, they decreased 1.83% until 2011 and increased 85.43% from 2011 to 2017. They decreased 0.86% from 2017 to 2018, ending with a value of 233 M€. The average salary is 168 M€ and during these analysed ten years, the club had been national champion seven times. Over the past ten years, it achieved an average of 82.5 points, had the highest payroll in five seasons and has been in the Champions League group stage in eight of ten seasons analysed.

4.3.2 AS Roma

Associazione Sportiva Roma is an Italian club, based on the city of Rome, founded on 7th of June 1927. In its history there are some titles, including: 1 Cities Cup with Fairs, 3 Italian Championships, 9 Italian Cups, 2 Italian Supercups and 1 Italian Championship (Serie B), totalling 16 titles. It currently occupies the 16th position in the UEFA club ranking.

From the data, we can note that wages were 126 M€ in 2009, they decreased 31.02% until 2011 and increased 13.66% from 2011 to 2012. From 2012 to 2013 they decreased 18.06% and increased 98.45% from 2013 to 2016. From 2016 to 2017 they decreased 9.94% and increased 3.45% from 2017 to 2018, ending with a value of 150 M€. The average salary is 120 M€ and during the ten years analysed, the club has never been national champion. Over the past ten years, the club has achieved an average of 72.3 points, never had the highest payroll and has been in the Champions League group stage in five of ten years analysed.

4.3.3 FC Internazionale Milano

Football Club Internazionale Milano is an Italian club, based in the city of Milan (Lombardy region), founded on 9th of March 1908. At national level it has won several titles including: 18 Italian Championships, 7 Italian Cups and 5 Italian Supercups. Internationally, won 1 World Clubs Championship, 2 Intercontinental Cups, 3 Champions League and 4 European Leagues, totalling 40 titles. It currently occupies the 54th position in the UEFA club ranking.

From the data, we can view that wages were 124 M€ in 2009 and increased 28.21% until 2011. They decreased 24.82% from 2011 to 2015 and increased 33.33% from 2015 until 2018, ending with a value of 160 M€. The average salary is 140 M€ and during the ten years analysed, the club has been national champion twice. Over the past ten years, the club has achieved an average of 67 points, had the highest payroll in one season and has been in the Champions League group stage in four of ten years analysed.

4.3.4 AC Milan

Associazione Calcio Milan is an Italian club based in Milan, founded on 18th of December 1899. At national level it has already several achievements, including: 18 Italian Championships, 5 Italian Cups, 7 Italian Supercups and 2 Italian Championships (Serie B). At international and world level, has in its history 1 World Club Championship, 3 Intercontinental Cups, 7 Champions League, 2 Cups Winner's Cup and 5 UEFA Supercups, totalling 50 titles. It currently occupies the 80th position in the UEFA club ranking.

From the data, we can observe that wages were 151 M€ in 2009, they decreased 3.60% until 2010, increased 15.14% from 2010 to 2011 and decreased 7.93% until 2013. They increased 6.40% from 2013 to 2015, decreased 21.95% from 2015 to 2017 and increased 17.50% from 2017 to 2018, ending with a value of 150 M€. The average salary is 155 M€ and during these analysed ten years, the club has been national champion once. Over the past ten years, it achieved an average of 67.1 points, had the highest payroll in five seasons and has been in the Champions League group stage in five of ten seasons analysed.

4.3.5 Italian League: Individual Results

Italian League	1st Regression	2nd Regression	3rd Regression	4th Regression
	OLS	OLS	Logit	Logit
Milwagebill	0.09	-	0.06	-
P-values	0.035	-	0.017	-
Milwagediff	-	0.00	-	0.08
P-values	-	0.981	-	0.018
Idas à Champions	-	21.59	-	-
P-values	-	0.000	-	-
Global Significance	0.0000	0.0000	0.0005	0.0001

Table 3: Coefficients from the regressions in the Italian League

The variable "Milwagebill" appears in the first and third regressions and in all of them takes positive values: 0.09 and 0.06 respectively. This means that when the salary increases, the number of points and the probability of winning the national championship increases as well, which validates our hypothesis that exists a positive relationship between them, although the numbers are small, meaning that the impact of wages is not that big. This variable is also individually significant to explain the number of points and the probability of winning the national championship, as it presents p-values of 0.035 and 0.017, below the standard significance level of 5%.

The variable "Milwagediff" appears in the second and fourth regressions with values of 0.00 and 0.04 respectively. This means that when the salary difference increases between each club and the club with the highest payroll in each season, the number of points is not influenced, so is difficult to validate any hypothesis. The probability of winning the national championship of the clubs increases with wage differences, but very little, there is a positive relationship between the two variables, but very small. It is not an individually significant variable to explain the number of points, as it presents a p-value of 0.981, above the standard significance level of 5%. However it is an individually significant variable to explain the probability of winning the national championship, as it presents a p-value of 0.018, below the standard significance level of 5%.

The variable "Idas à Champions" appears in the second regression and it presents a positive coefficient of 21.59. This means that when a club participates in the group stage of the Champions League it increases the probability of getting more points, because the revenues

increases and the clubs are stronger and better positioned to fight for the top places in their domestic leagues. This validates our hypothesis that exists a positive relationship between the two variables. It is also an individually significant variable to explain the number of points obtained in the end of the season, because it presents p-values of 0.000, bellow the standard significance level of 5%.

We can check for global significance of each of the models used by looking for the p-values in each of the four regressions. As the p-values of all the models are lower than the standard significance level of 5%, we can state that all the presented models are globally significant.

4.4 French League

Note: In the first four seasons analysed, between 2009 and 2012, the first French League champion clubs were FCG Bordeaux in 2009, Olympique de Marseille in 2010, LOSC Lille in 2011 and Montpelier HSC in 2012. During the first decade of the 21st century, the French league was dominated by Lyon and the four clubs mentioned above. Only from 2012 onwards did Paris Saint-Germain assert themselves and have completely dominated this competition. Due to the lack of salary data and the sample analysed being only 10 years, we will not address the four winners of the first 4 seasons analysed. In 2017, the French League champion was AS Monaco FC, but due to a total lack of information about the club salaries, it will not be addressed in this work either.

4.4.1 Paris Saint-Germain

Paris Saint-Germain Football Club is a French club based in Paris, founded on 12th of August 1970 following an initiative of 20000 football fans who wished the city of Paris to have a great football team. The project of creation of this team was a partnership with Saint-Germain-en-Laye that, in the year of the creation of the club rose, to the French second league, having been national champion in that same year. Despite being a relatively new club, it has already achieved several triumphs, especially at national level, including: 8 French Championships (Ligue 1), 12 French Cups, 8 French League Cups, 9 European Supercups and 1 French Championship (Ligue 2). At international level, the team has won 1 Cup Winner's Cup and 1 UEFA Intertoto cup, totalling 40 titles. It currently occupies the 7th position in the UEFA club ranking.

From the data, we can observe that wages were 71 M€ in 2009, decreased 13.27% until 2010 and increased 165.22% from 2010 to 2012. From 2012 to 2013 they decreased 32.09% and increased 164.85% from 2013 to 2016. From 2016 to 2017 they decreased 6.85% and increased 22.10% from 2017 to 2018, ending with a value of 332 M€. The average salary is 186 M€ and during these analysed ten years, the club has been national champion five times. Over the past ten years, it achieved an average of 78.1 points, had the highest payroll in seven seasons and has been in the Champions League group stage in seven of ten seasons analysed.

4.4.2 Olympique Lyonnais

Olympique Lyonnais is a French club from the city of Lyon which was founded on 3rd of August 1950. In terms of titles, it already has 7 French Championships, 5 French Cups, 1 French League Cup, 8 French Supercups, 3 French Championships (Ligue 2) and 1 Intertoto Cup, totalling 25 titles. It currently occupies the 17th position in the UEFA club ranking.

From the data, we can note that wages were 95 M€ in 2009, increased 17.43% until 2010 and decreased 33.05% from 2010 to 2014. The wages increased 53.84% from 2014 to 2018, ending with a value of 115 M€. The average salary is 96 M€ and during the ten years analysed, the club has never been national champion. Over the past ten years, the club has achieved an average of 68.4 points, had the highest payroll in three seasons and has been in the Champions League group stage in six of ten years analysed.

4.4.3 French League: Individual Results

French League	1st Regression	2nd Regression	3rd Regression	4th Regression
	OLS	OLS	Logit	Logit
Milwagebill	0.1	-	0.02	-
P-values	0.000	-	0.013	-
Milwagediff	-	0.03	-	-
P-values	-	0.261	-	-
Idas à Champions	-	17.28	-	-
P-values	-	0.001	-	-
Global Significance	0.0000	0.0015	0.0014	-

Table 4: Coefficients from the regressions in the French League

The variable "Milwagebill" appears in the first and third regressions and in all of them takes positive values: 0.1 and 0.02 respectively. In the first case, when the salary increases, the number of points increases, which validates our hypothesis that exists a positive relationship between the two variables. In the case of the probability of being champion, the relation is positive but very low, the impact is small. This variable is also individually significant to explain the number of points, as it presents p-values of 0.000 and 0.013, below the standard significance level of 5%.

The variable "Milwagediff" appears in the second regression and it presents a positive coefficient of 0.03. This means that when the salary difference increases between each club and

the club with the highest payroll in each season, the number of points increases as well, the relationship is positive but small between these two variables. It is not an individually significant variable to explain the number of points, as it presents a p-value of 0.261, above the standard significance level of 5%.

The variable "Idas à Champions" appears in the second regression and it presents a positive coefficient of 17.28. This means that when a club participates in the group stage of the Champions League it increases the probability of getting more points, because the revenues increases and the clubs are stronger and better positioned to fight for the top places in their domestic leagues. This validates our hypothesis that exists a positive relationship between the two variables. It is also an individually significant variable to explain the number of points obtained in the end of the season, because it presents a p-value of 0.001, bellow the standard significance level of 5%.

We can check for global significance of each of the models used by looking for the p-values in each of the three regressions. As the p-values of all the models are lower than the standard significance level of 5%, we can state that all the presented models are globally significant.

4.5 German League

Note: In the 2008/2009 season, the Bundesliga champion was the club Vfl Wolfsburg who won the German title for the first time in their history with a total of 69 points, two more than second-placed Bayern de München. Wolfsburg ended the season with 21 wins, 6 draws, 7 losses, 80 goals scored and 41 conceded. It also featured the league's top scorer with a total of 28 goals. Due to a lack of credible salary information we will not review this club.

4.5.1 FC Bayern de München

Fußball-Club Bayern München is a German club based in the city of Munich (state of Baviera) and was founded on 27th of February 1900 by eleven football players, initially named "Schwabinger Bayern", which was changed a few years later to the current name. It already has dozens of national titles, namely: 29 German Championships, 19 German Cups, 7 German Supercups and 6 German League cups. At world and international level has in its history: 1 Clubs World Championship cup, 2 Intercontinental Cups, 5 Champions League, 1 Europa League, 1 Cup Winners Cup and 1 UEFA Supercup, totalling 72 titles. It currently occupies the 3rd position in the UEFA club ranking.

From the data, we can observe that wages were 154 M€ in 2009, they decreased 3.86% until 2010 and increased 13.76% from 2010 to 2011. From 2011 to 2013 the wages decreased 12.26 % and increased 105.28% from 2013 to 2018, ending with a value of 303 M€. The average salary is 208 M€ and during these analysed ten years, the club has been national champion seven times. Over the past ten years, it achieved an average of 78.6 points, had always the highest payroll and has been in the Champions League group stage in all the seasons analysed.

4.5.2 Borussia Dortmund

Ballspielverein Borussia 09 e. V. Dortmund is a German club based in the city of Dortmund (Renânia North Westphalia) which was founded by eighteen Dortmund football players. At national level it has won 8 German Championships, 4 German cups and 6 German Supercups. At world and international level, it has gained 1 Intercontinental cup, 1 Champions League and 1 Cup Winners Cup, totalling 21 titles. It currently occupies the 14th position in the UEFA club ranking.

From the data, we can note that wages were 50 M€ in 2009, decreased 4.10% until 2010 and increased 289.31% from 2010 to 2018, ending with a value of 187 M€. The average salary

is 108 M€ and during the ten years analysed, the club has been national champion twice. Over the past ten years, the club has achieved an average of 65.1 points, never had the highest payroll and has been in the Champions League group stage in seven of ten years analysed.

4.5.3 FC Schalke 04

Fußball-club Gelsenkirchen-Schalke 04 is a German club based in the city of Gelsenkirchen (Ruhr Valley), founded on 4th of May 1904 by a group of 14- and 15-years old teenagers, who had the dream of playing football with the name of Westphalia Schalke. It already has several national and international titles including: 1 Europa League, 1 Intertoto cup, 7 German Championships, 5 German Cups, 1 German Supercup, 1 German League cup and 2 German Championships (Second League), totalling 18 titles. It currently occupies the 31st position in the UEFA club ranking.

From the data, we can view that wages were 68 M€ in 2009, increased 46.32% until 2011 and decreased 1.61% from 2011 to 2013. They increased 16.35% from 2013 until 2014, decreased 3.79% from 2014 to 2016 and increased 13.44% from 2016 until 2018, ending with a value of 125 M€. The average salary is 103 M€ and during the ten years analysed, the club had never been national champion. Over the past ten years, the club has achieved an average of 54.1 points, never had the highest payroll and has been in the Champions League group stage in five of the ten years analysed.

4.5.4 German League: Individual Results

German League	1st Regression	2nd Regression	3rd Regression	4th Regression
	OLS	OLS	Logit	Logit
Milwagebill	0.06	-	0.02	-
P-values	0.051	-	0.014	-
Milwagediff	-	0.08	-	0.03
P-values	-	0.021	-	0.008
Idas à Champions	-	18.13	-	-
P-values	-	0.000	-	-
Global Significance	0.0000	0.0000	0.0028	0.0012

Table 5: Coefficients from the regressions in the German League

The variable “Milwagebill” appears in the first and third regressions and in all of them takes positive values: 0.06 and 0.02 respectively. This means that when the salary increases,

the number of points and the probability of winning the national championship increases as well, which validates our hypothesis that exists a positive relationship between them, although in both cases the impacts are small. This variable is also individually significant to explain the number of points, as it presents p-values of 0.051 and 0.014, below the significance level of 10%.

The variable "Milwagediff" appears in the second and fourth regressions and in all of them takes positive values: 0.08 and 0.03 respectively. This means that when the salary difference increases between each club and the club with the highest payroll in each season, the number of points and the probability of winning the national championship of the clubs increases as well, there is a positive relationship between the variables, although with small values. This variable is also individually significant to explain the number of points and the probability of winning the national championship, as it presents p-values of 0.021 and 0.008, below the standard significance level of 5%.

The variable "Idas à Champions" appears in the second regression and it presents a positive coefficient of 18.13. This means that when a club participates in the group stage of the Champions League it increases the probability of getting more points, because the revenues increases and the clubs are stronger and better positioned to fight for the top places in their domestic leagues. This validates our hypothesis that exists a positive relationship between the two variables. It is also an individually significant variable to explain the number of points obtained in the end of the season, because it presents a p-value of 0.000, bellow the standard significance level of 5%.

We can check for global significance of each of the models used by looking for the p-values in each of the three regressions. As the p-values of all the models are lower than the standard significance level of 5%, we can state that all the presented models are globally significant.

4.6 English League

Note: In the 2015/2016 the Premier League champion was the Leicester City Football Club, having won the title with two rounds left to finish the Premier League. They finished with a total of 81 points, 10 points more than second-placed Arsenal FC. Leicester had a total of 23 wins, 12 draws, 3 losses, 68 goals scored and 36 conceded. It was a perfectly atypical season in the Premier League, because the top contenders for the title (Manchester City FC, Manchester United FC, Liverpool FC, Chelsea FC and Tottenham Hotspur) had a very disappointing season. Even though they were promoted to the Premier League in the 2013/2014 season and almost relegated in the following season, Leicester achieved a brilliant and historic feat due to the huge difference in value to their big rivals. Due to the lack of reliable information on club salaries and the lack of importance and titles in the years analysed, we will not look into the club in this thesis.

4.6.1 Manchester United FC

Manchester United Football Club is an English club based in Trafford in the Metropolitan area of Manchester and is one of the most popular and successful clubs in England and the world. It was founded in 1878 but its present name came only in 1902. Nationally, the team already has 20 Premier Leagues, 12 English Cups, 5 English League Cups, 21 English Supercups and 2 English Championships. Internationally, he has won 1 Club World's Cup, 1 Intercontinental Cup, 3 Champions League, 1 Europa League and 1 UEFA Supercup, totalling 67 titles. It currently occupies the 10^{th} position in the UEFA club ranking.

From the data, we can observe that wages were 201 M€ in 2009, decreased 24.40% until 2010 and increased 63.11% from 2010 to 2014. From 2014 to 2015 the wages decreased 5.70% and increased 45.95% from 2015 to 2018, ending with a value of 342 M€. The average salary is 232 M€ and during these analysed ten years, the club has been national champion three times. Over the past ten years, it achieved an average of 78.3 points, had the highest payroll in three seasons and has been in the Champions League group stage in eight of ten seasons analysed.

4.6.2 Manchester City FC

The Manchester City Football Club is an English club founded on 23rd of November 1880 as the Ardwick AFC and it was only on 16th of April 1894 that it adopted its current name, being based in Manchester, North West England. It is considered one of the top clubs in England today and one of the oldest and most traditional in England, having spent most of his history in the Premier League. In 2008 the club was bought by the Abu Dhabi United group for United Arab Emirates Development and Investment, becoming one of the richest and most competitive clubs in the world, having won several major trophies since 2011. In terms of titles, the club already holds 1 Cup Winners Cup, 6 Premier Leagues, 6 England Cups, 6 English League Cups, 6 England Supercups and 7 English Championships, totalling 32 titles. It currently occupies the 6th position in the UEFA club ranking.

From the data, we can note that wages were 96 M€ in 2009, increased 182.10% until 2013 and decreased 16.85% from 2013 to 2015. The wages increased 36.28% from 2015 to 2017 and decreased 1.70% from 2017 to 2018, ending with a value of 300 M€. The average salary is 225 M€ and during the ten years analysed, the club has been national champion two times. Over the past ten years, the club has achieved an average of 76.4 points, had the highest payroll in three seasons and has been in the Champions League group stage in seven of ten years analysed.

4.6.3 Liverpool FC

Liverpool Football Club is an English club based in the city of Liverpool, North West England and was founded on 3rd of June 1892. It is one of the most victorious clubs in England and Europe, having won 6 Champions Leagues, 3 European Leagues, 4 UEFA Supercups, 18 Premier Leagues, 7 England Cups, 8 English League Cups, 15 England Supercups and 4 English Championships, totalling 65 titles. It currently occupies the 8th position in the UEFA club ranking.

From the data, we can view that wages were 116 M€ in 2009, increased 34.15% until 2011 and decreased 11.94% from 2011 to 2012. The wages increased 122.14% from 2012 until 2018, ending with a value of 305 M€. The average salary is 185 M€ and during the ten years analysed, the club has never been national champion. Over the past ten years, the club has achieved an average of 67.7 points, has never had the highest payroll and has been in the Champions League group stage in four of ten years analysed.

4.6.4 Chelsea FC

Chelsea Football Club is an English club based in the city of London, founded on 10th of March 1905 in a pub called Rising the Sun. In 2003, the club was bought by Russian oil magnate Roman Abramovich. Throughout its long and important history, it has won numerous titles, including: 1 Champions League, 2 Europe Leagues, 2 Cups Winner's Cups, 1 UEFA Supercup, 6 Premier Leagues, 8 English Cups, 5 English League Cups, 4 English Supercups, 2 English Member Cups and 2 English Championships, totalling 33 titles. It currently occupies the 13th position in the UEFA club ranking.

From the data, we can observe that wages were 150 M€ in 2009, increased 48.44% until 2012 and decreased 18.36% from 2012 to 2013. The wages increased 63.70% from 2013 to 2016 and decreased 18.37% from 2016 to 2018, ending with a value of 244 M€. The average salary is 220 M€ and during these analysed ten years, the club has been national champion three times. Over the past ten years, it achieved an average of 76.1 points, had the highest payroll in three seasons and has been in the Champions League group stage in eight of ten seasons analysed.

4.6.5 Arsenal FC

Arsenal Football Club is an English club, based in London, founded in October 1886 from the idea of a group of Woolwich Arsenal Armament Factory workers who, for fun, decided to create a football team. In their history they already have 1 Cup Winners Cup, 1 Cup of the City with Fairs, 13 Premier Leagues, 13 English cups, 2 English League cups and 15 English Supercups, totalling 45 titles. It currently occupies the 9th position in the UEFA club ranking.

From the data, we can note that wages were 120 M€ in 2009 and increased 130.88% until 2018, ending with a value of 278 M€. The average salary is 189 M€ and during the ten years analysed, the club has never been national champion. Over the past ten years, the club has achieved an average of 72.1 points, never had the highest payroll and has been in the Champions League group stage in eight of ten years analysed.

4.6.6 English League: Individual Results

English League	1st Regression	2nd Regression	3rd Regression	4th Regression
	OLS	OLS	Logit	Logit
Milwagebill	0.04	-	0.01	-
P-values	0.063	-	0.316	-
Milwagediff	-	0.05	-	0.03
P-values	-	0.145	-	0.041
Idas à Champions		13.76	1.4	-
P-values		0.000	0.210	-
Global Significance	0.0000	0.0000	0.2029	0.0264

Table 6: Coefficients from the regressions in the English League

The variable "Milwagebill" appears in the first and third regressions and in all of them takes positive values: 0.04 and 0.01 respectively. This means that when the salary increases, the number of points and the probability of winning the national championship increases as well, which validates our hypothesis that exists a positive relationship between them, although the values are very small. This variable is individually significant to explain the number of points, as it presents p-values of 0.063, below the significance level of 10%. However it is not an individually significant variable to explain the probability of winning the national championship, as it presents a p-value of 0.316, higher than the standard significant level of 5%.

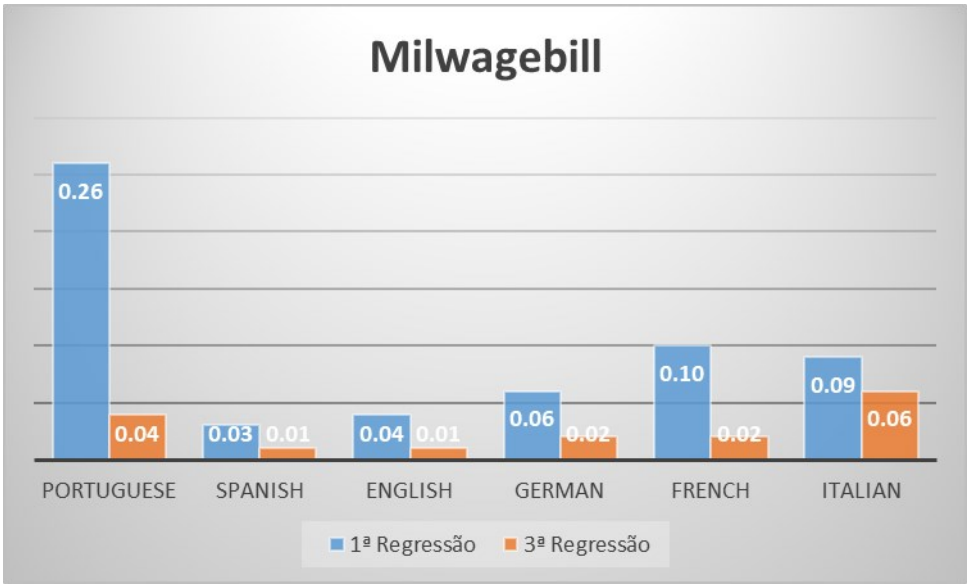
The variable "Milwagediff" appears in the second and fourth regressions and in all of them takes positive values: 0.05 and 0.03 respectively. This means that when the salary difference increases between each club and the club with the highest payroll in each season, the number of points and the probability of winning the national championship of the clubs increases as well, which means there is a positive relationship between them, although the impact is small. It is not an individually significant variable to explain the number of points, as it presents a p-value of 0.145, above the standard significance level of 5%. However it is an individually significant variable to explain the probability of winning the national championship, as it presents a p-value of 0.041, below the standard significance level of 5%.

The variable "Idas à Champions" appears in the second and third regressions and in all of them take positive values: 13.76 and 1.4 respectively. This means that when a club participates

in the group stage of the Champions League it increases the probability of getting more points and winning the national championship, because the revenues increases and the clubs are stronger and better positioned to fight for the top places in their domestic leagues. This validates our hypothesis that exists a positive relationship between the three variables. It is also an individually significant variable to explain the number of points, as it presents a p-value of 0.000, below the standard significance level of 5%. However it is not an individually significant variable to explain the probability of winning the national championship, as it presents a p-value of 0.210, above the standard significance level of 5%.

We can check for global significance of each of the models used by looking for the p-values in each of the four regressions. As the p-values of the first, second and fourth models are lower than the standard significance level of 5%, we can state that the models mentioned above are globally significant. However, as the p-value of the third model is 0.2029, higher than the standard significance level of 5%, we can conclude that this model is not globally significant

5 General Results



Graphic 1: "Milwagebill" Coefficients across the six leagues

In this graphic are represented the first and third regressions that relate, respectively, the wage bill of the clubs, the number of points and the probability of winning the national championship. The main results are the following:

In the Portuguese League, the coefficient is 0.26, much higher than in the others leagues, which means that in Portugal it is more difficult to get more points in the end of the season, if you don't have a higher wage bill. And we can see from the numbers of the clubs that Sporting Clube de Portugal, who had lower wage bills than FC Porto and SL Benfica, was never a champion in the analysed period. Adding to this reason, there were only 3 seasons where the champion was not the club with the highest wages. This was the case of SL Benfica that was national championship in the seasons 2015, 2016 and 2017 with lower wages than FC Porto.

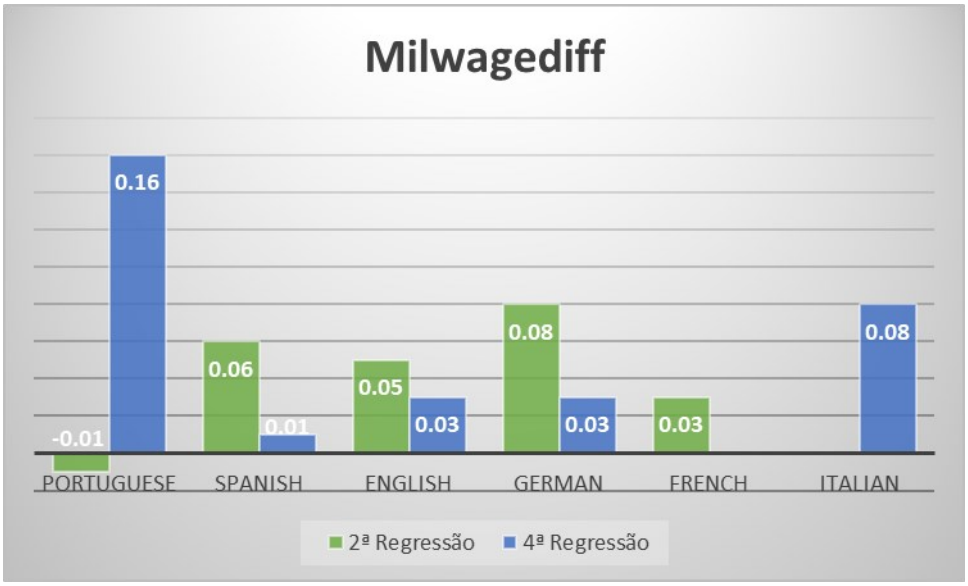
In the Spanish League, the coefficient is 0.03, the lowest one of the analysed leagues, which means that wages are not so relevant to the total number of points that the teams achieved in the end of the season, and the probability to become a champion in this league. And the real numbers confirm exactly this: Club Atlético de Madrid was champion in 2014, with a lower wage bill (113 M€) than FC Barcelona and Real Madrid CF, respectively, 212 M€ and 270 M€. Adding to this reason, FC Barcelona was champion in 4 seasons (2009, 2010, 2011 and 2013) with a lower wage bill than Real Madrid CF.

In the English League, the coefficient is 0.04, which is also low and consistent with reality, even with the results of Leicester not included in our analysis. There were five other seasons when the champions were not the club with the highest wages: Manchester City FC in 2014 (237 M€) and 2018 (300 M€), Manchester United FC in 2011 (177 M€) and 2013 (209 M€) and Chelsea FC in 2017 (256 M€).

In the German League, we have also a club which was a champion, Vfl Wolfsburg in 2009, and for the reasons explained before, it was not included in our analysis. Borussia Dortmund was a champion for two seasons 2011 and 2012, even with a lower wage bill than FC Bayern München, respectively, 62 M€ and 82 M€. So, a low coefficient of only 0.06 is consistent with the reality.

In the French League, numbers should be looked at with more caution, since we have four champions which were not included in this work – FCG Bordeaux in 2009, Olympique de Marseille in 2010, LOSC Lille in 2011 and Montpellier HSC in 2012. And there was a year in which AS Monaco FC, that was also not included, was a champion (2017), even with a lower wage bill than Paris Saint Germain. So the coefficient of 0.1, is somehow expected because Paris Saint Germain was champion five times (2013, 2014, 2015, 2016 and 2018), always with the higher wage bill.

In the Italian League, the coefficient is 0.09, and the numbers confirm that wages are more relevant than in other European leagues. Juventus FC won Serie A seven times in a row, five of them with the higher wage bill. AC Milan and FC Internazionale de Milano were also champions with the higher wage bill with, respectively, 167 M€ in 2011 and 145 M€ in 2010. Only in 3 seasons the champion was not the club with the highest wage bill. These cases were Juventus FC in the years of 2012 (137 M€) and 2013 (149 M€) and FC Internazionale de Milano in the year of 2009 with a wage bill of 124 M€.



Graphic 2: "Milwagediff" Coefficients across the six leagues

In this graphic are represented the second and fourth regressions that relate, respectively, the wage difference of the clubs, the number of points and the probability of winning the national championship. The main results are the following:

In the Portuguese League, the correlation between the wage difference and the total number of points achieved in the end of the season has a negative coefficient of -0.01, which means that if the wage difference for the club with the highest wage bill increases, than the number of points decreases, but the probability of being champion is still high, with a coefficient od 0.16. And, in 2015, 2016 and 2017, SL Benfica was a champion even with lower wages than FC Porto, and the difference was big in 2015 and 2016, more than 10 million of euros.

In the Spanish League, the correlation as a stronger value than in other leagues, 0.06, which means that it is more possible to be a champion even with big wage differences. And Club Atlético de Madrid was a champion in 2014, even with an enormous wage difference from Real Madrid FC. The wage bill of Real Madrid FC was 270 million, and the wage bill of Club Atlético de Madrid was only 113 million, a difference of 157 million and even though they were champions. And FC Barcelona was also a champion in four seasons without the biggest wage bill: 173 M€ in 2009, 204 M€ in 2010, 206 M€ in 2011 and 204 M€.

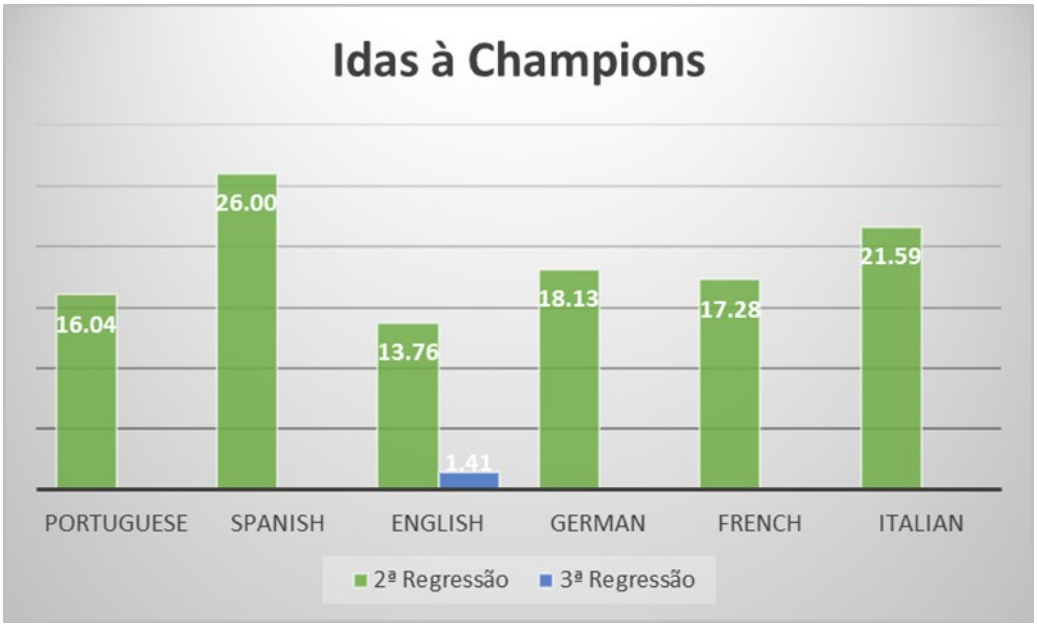
In the English League, the coefficient as a value of 0.05, which means that the wage difference is not so important, but is relevant. There were 3 champions without having the biggest wage bill of the League: Manchester City FC in 2014 (237 M€) and 2018 (300 M€),

Manchester United FC in 2011 (177 M€) and 2013 (209 M€) and Chelsea FC in 2017 (256 M€). There was also the case of Leicester FC which is not included, due to lack of reliable information.

In the case of the German League, the coefficient is 0.08, which means that it is possible to have more points even with wage differences, and there is a possibility of being champion even with wage differences, but it is lower, only 0,03. And reality seems to validate this possibility, since Borussia Dortmund was a champion two times, even with a big wage difference for Bayern Munich.

The French League coefficient is 0.03, which is very low, but these results have to be look at with caution, because 5 champions were not included in the work. These clubs were FCG Bordeaux in 2009, Olympique de Marseille in 2010, LOSC Lille in 2011, Montpellier HSC in 2012 and AS Monaco FC in 2017. But we can still say that even with some wage differences, clubs can be champions without having the biggest wage bill in the League.

The Italian League results show a coefficient of 0.0, meaning that wage differences do not give more points, but the probability of being champion shows a value of 0,08, so it is possible to be a champion without the biggest wage bill in the League. And FC Internazionale de Milano in 2009, was champion with a difference on the wage bill of 26 million euros, compared to AC Milan which spent 150 million euros. And Juventus in 2012 and 2013, was also champion without having the biggest wage bill, compared to 146 M€ in 2012 from FC Internazionale de Milano and 162 M€ in 2012 from AC Milan.



Graphic 3: "Idas à Champions" Coefficients across the six leagues

In this graphic are represented the second and third regressions that relate, respectively, the number of times that each club is present in the group stage of the Champions League, the number of points and the probability of winning the national championship. The main results are the following:

In these cases, all the coefficients are very strong, varying between 26 in the case of Spain and 13,76 in the case of England. This means that the champions in all countries are clubs that consistently went to the group stage of the Champions League in the last decade. In all leagues, there are some cases of clubs that are able to be champions, without being in the Champions League – Leicester FC in England or Montpellier HSC in France – but these are rare situations, not the norm.

6 Conclusions

The main objective of this dissertation was to understand the relationship between the salaries of 20 football clubs and the probability of winning the national championship in the major six European Leagues (Portuguese, Spanish, Italian, French, German and English). To this end, this analysis was based on a set of econometric regressions that combined some variables, such as: salaries, salary differences, number of points, presences in the group stage of the Champions League and the probability of the club being champion nationally.

With this objective in mind, it was considered relevant to explore two themes in the literature review: the first one was pay and performance and the second one was the Competitive Balance (CB) in the studied football leagues. According to various authors, there is a correlation between performance, player spending and payroll, which is much stronger for football than for baseball. It was considered relevant to study the meaning of competitive balance and the factors that affect it (different access to technology and financing, unequal distribution of the revenues from the media, difference in tax systems, among others). It remains clear that the level of competitive balance in the leagues depends also on the distribution of the best players among the teams and the access of clubs to other sources of revenues, like the Champions League. This competition was object of several changes in the twenty-first century, like the increasing number of teams that participate and the escalation of payments to the participating teams. These allowed clubs to get more revenues, make better investments in the right players and achieve better results in the domestic leagues, making it possible for these teams to qualify again to the Champions League. This represents a vicious cycle where only the best clubs appear in the European competitions and get more money, whereas the small clubs have huge difficulties to get the revenues they need to survive and be more competitive. This increase in the European competition payments will lead to a decrease in the CB of the domestic leagues.

From this empirical study several results were obtained: first of all, the salary components influence positively the results of teams and this positive influence remains across all the leagues; second, the number of points that each team achieves in the end of the season is positively influenced by the salaries earned by players and staff and the wage difference between each club and the club with the highest payroll in each season, except for the Portuguese League, where this influence is negative; finally, the wage bill and wage difference of the clubs are individually significant to explain the probability of succeed nationally.

This study has some limitations. No conclusions could be drawn concerning the results variability from club to club, only from league to league, as the variables representing the clubs are not individually significant. This is a consequence of the lack of availability and credibility of information, which limited the construction of the regressions and the choice of the leagues and clubs to study - only six leagues and twenty clubs were analysed, which greatly restricts the sample.

Despite the identified limitations, and others that may be pointed out, we can consider that this work allow us to understand the importance of the salaries in the success of the clubs. Future investigations could use broader samples, both in terms of leagues and clubs, and comparisons between larger and smaller clubs to really understand the effect of salaries on club success.

Finally, I hope this study may contribute to a better perception of the real importance of money in the world of football. Given the importance of the topic, there is still much to discover in the field of research in this area and therefore it is a fertile field of work for future researchers.

7 References

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- Pawlowski, Tim; Breuer, Christoph; Hovemann, Arnd, 2010. Top Clubs' Performance and the Competitive Situation in European Domestic Football Competitions, *Journal of Sports Economics*, 11(2), 186-202.
- https://www.statista.com/statistics/251147/revenue-of-fc-chelsea-london-by-stream/, (Revenues Chelsea FC (2009-2018))
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- https://en.wikipedia.org/wiki/Deloitte_Football_Money_League, (Deloitte Money League Report)
- http://swissramble.blogspot.com/2012/08/atletico-madrid-its-mad-world.html, (CF Atlético de Madrid salaries 2009 and 2010)
- **https://www.totalsportek.com/football/atletico-madrid-players-salaries/**, (salaries from CF Atlético de Madrid in 2018)
- **https://www.totalsportek.com/money/inter-milan-salaries/**, (FC Internazionale de Milano salaries from 2018)
- **https://www.totalsportek.com/money/roma-players-salaries/**, (AS Roma salaries from 2018)
- https://www.totalsportek.com/football/chelsea-player-salaries/, (Chelsea FC salaries in 2018)

- **Portuguese League:**
  - SL Benfica wage bill come from the club annual reports from the years of 2009 until 2018, available on the club website.
  - FC Porto wage bill come from the club annual reports from the years of 2009 until 2018, available on the club website.
  - Sporting Clube de Portugal wage bill come from the club annual reports from the years of 2009 until 2018, available on the club website.

- **Spanish League:**
    - Barcelona FC wage bill come from the club annual reports from the years of 2009 until 2018, available on the club website.
    - Real Madrid CF wage bill between the years of 2014 and 2018 come directly from the UEFA annual reports, available in UEFA's website. Between 2009 and 2013, the club salaries were constructed as a percentage of the club total revenues. This percentages were taken from the UEFA annual reports and the total revenues were found in the site statistica, presented above.
    - Club Atlético de Madrid wage bill of 2018 come from the site Total Sportek presented above, converted to euros. Between the years of 2014 and 2017, they come directly from the UEFA annual reports, available in UEFA's website. Between 2009 and 2013, the club salaries were constructed as a percentage of the club total revenues. This percentages were taken from the UEFA annual reports and the total revenues were found between the Deloitte Money League report and the Swiss Ramble blog. The sites are presented above.
- **German League:**
    - Borussia Dortmund wage bill come from the club annual reports from the years of 2009 until 2018, available on the club website.
    - FC Schalke 04 wage bill come from the club annual reports from the years of 2009 until 2018, available on the club website.
    - FC Bayern de München wage bill of 2018 come from the Annual financial statements. Between the years of 2014 and 2017, they come directly from the UEFA annual reports, available in UEFA's website. Between 2009 and 2013, the club salaries were constructed as a percentage of the club total revenues. This percentages were taken from the UEFA annual reports and the total revenues were found in the Deloitte Money League report, which site is presented above.
- **Italian League:**
    - Juventus FC wage bill come from the club annual reports from the years of 2009 until 2018, available on the club website.
    - AS Roma wage bill of 2018 come from the site Total Sportek presented above. Between the years of 2014 and 2017, they come directly from the UEFA annual reports, available in UEFA's website. Between 2009 and 2013, the club salaries were constructed as a percentage of the club total revenues. This percentages were

taken from the UEFA annual reports and the total revenues were found in the Deloitte Money League report, which site is presented above.

- FC Internazionale de Milano wage bill of 2018 come from the site Total Sportek presented above. Between the years of 2014 and 2017, they come directly from the UEFA annual reports, available in UEFA's website. Between 2009 and 2013, the club salaries were constructed as a percentage of the club total revenues. This percentages were taken from the UEFA annual reports and the total revenues were found in the Deloitte Money League report, which site is presented above.
- AC Milan wage bill from the year of 2018 come from the club annual report of the same year, available on the club website. Between the years of 2014 and 2017, they come directly from the UEFA annual reports, available in UEFA's website. Between 2009 and 2013, the club salaries were constructed as a percentage of the club total revenues. This percentages were taken from the UEFA annual reports and the total revenues were found in the Deloitte Money League report, which site is presented above.

- **English League:**
  - Manchester United FC wage bill come from the club annual reports from the years of 2010 until 2018, available on the club website. All these values were converted from pounds to euros. In the year of 2009, the club salary is constructed as a percentage of the club total revenues. This percentage was taken from the UEFA annual report and the total revenue was found in the Deloitte Money League report, which site is presented above.
  - Manchester City FC wage bill come from the club annual reports from the years of 2009 until 2018, available on the club website. All these values were converted from pounds to euros.
  - Chelsea FC wage bill from the year of 2018 come from the site Total Sportek available above. Between the years of 2014 and 2017, they come directly from the UEFA annual reports, available in UEFA's website. Between 2009 and 2013, the club salaries were constructed as a percentage of the club total revenues. This percentages were taken from the UEFA annual reports and the total revenues were found in the site statistica presented above.
  - Liverpool FC wage bill come from the club annual reports from the years of 2009 until 2018, available on the club website. All these values were converted from pounds to euros.

- Arsenal FC wage bill come from the club annual reports from the years of 2009 until 2018, available on the club website. All these values were converted from pounds to euros.

- **French League:**
  - Paris Saint-Germain wage bill from the year of 2018 come from the club annual report of the same year, available on the club website. Between the years of 2014 and 2017, they come directly from the UEFA annual reports, available in UEFA's website. Between 2009 and 2013, the club salaries were constructed as a percentage of the club total revenues. This percentages were taken from the UEFA annual reports and the total revenues were found in the Paris Saint Germain Project report.
  - Olympique Lyonnais wage bill come from the club annual reports from the years of 2009 until 2018, available on the club website.

8 Appendix A – List of Figures

Figure 1: Points vs Milwagebill vs Idas à Champions (Portuguese League)

```
. reg pts milwagebill idaàchampions
```

Source	SS	df	MS		
				Number of obs	= 30
				F(2, 27)	= 13.03
Model	2034.71243	2	1017.35621	Prob > F	= 0.0001
Residual	2108.25424	27	78.0834904	R-squared	= 0.4911
				Adj R-squared	= 0.4534
Total	4142.96667	29	142.86092	Root MSE	= 8.8365

pts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
milwagebill	.2636553	.1129965	2.33	0.027	.0318056	.4955049
idaàchampions	10.731	4.17886	2.57	0.016	2.156684	19.30531
_cons	50.70573	5.108466	9.93	0.000	40.22402	61.18744

Figure 2: Points vs Milwagediff vs Idas à Champions (Portuguese League)

```
. reg pts milwagediff idaàchampions
```

Source	SS	df	MS		
				Number of obs	= 30
				F(2, 27)	= 8.58
Model	1609.78093	2	804.890466	Prob > F	= 0.0013
Residual	2533.18574	27	93.8216939	R-squared	= 0.3886
				Adj R-squared	= 0.3433
Total	4142.96667	29	142.86092	Root MSE	= 9.6862

pts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
milwagediff	-.0072205	.16515	-0.04	0.965	-.3460803	.3316392
idaàchampions	16.04187	4.078824	3.93	0.001	7.672818	24.41093
_cons	60.3362	4.068647	14.83	0.000	51.98803	68.68438

Figure 3: Probability of Winning vs Milwagebill (Portuguese League)

```
. logit champ milwagebill

Iteration 0:   log likelihood = -19.095425
Iteration 1:   log likelihood = -17.974517
Iteration 2:   log likelihood = -17.962923
Iteration 3:   log likelihood = -17.962918
Iteration 4:   log likelihood = -17.962918

Logistic regression                             Number of obs     =         30
                                                LR chi2(1)        =       2.27
                                                Prob > chi2       =     0.1323
Log likelihood = -17.962918                     Pseudo R2         =     0.0593
```

champ	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
milwagebill	.0357824	.0247581	1.45	0.148	-.0127426	.0843074
_cons	-2.572946	1.398084	-1.84	0.066	-5.31314	.1672488

Figure 4: Probability of Winning vs Milwagediff (Portuguese League)

```
. logit champ milwagediff

Iteration 0:   log likelihood = -19.095425
Iteration 1:   log likelihood = -15.842143
Iteration 2:   log likelihood = -15.367843
Iteration 3:   log likelihood = -15.363176
Iteration 4:   log likelihood = -15.363176

Logistic regression                             Number of obs     =         30
                                                LR chi2(1)        =       7.46
                                                Prob > chi2       =     0.0063
Log likelihood = -15.363176                     Pseudo R2         =     0.1955
```

champ	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
milwagediff	.1624683	.0805333	2.02	0.044	.004626	.3203105
_cons	.3165879	.551511	0.57	0.566	-.7643538	1.39753

Figure 5: Points vs Milwagebill vs Idas à Champions (Spanish League)

```
. reg pts milwagebill idaàchampions
```

Source	SS	df	MS		
Model	3443.17678	2	1721.58839	Number of obs	= 30
Residual	1594.28988	27	59.0477735	F(2, 27)	= 29.16
				Prob > F	= 0.0000
				R-squared	= 0.6835
				Adj R-squared	= 0.6601
Total	5037.46667	29	173.705747	Root MSE	= 7.6843

pts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
milwagebill	.0313196	.0143559	2.18	0.038	.0018637	.0607755
idaàchampions	28.68062	5.321807	5.39	0.000	17.76118	39.60007
_cons	51.59556	4.536939	11.37	0.000	42.28653	60.90459

Figure 6: Points vs Milwagediff vs Idas à Champions (Spanish League)

```
. reg pts milwagediff idaàchampions
```

Source	SS	df	MS		
Model	3741.33877	2	1870.66938	Number of obs	= 30
Residual	1296.1279	27	48.0047369	F(2, 27)	= 38.97
				Prob > F	= 0.0000
				R-squared	= 0.7427
				Adj R-squared	= 0.7236
Total	5037.46667	29	173.705747	Root MSE	= 6.9285

pts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
milwagediff	.0550697	.015854	3.47	0.002	.02254	.0875994
idaàchampions	26.00051	4.835489	5.38	0.000	16.07891	35.92211
_cons	65.89867	5.329381	12.37	0.000	54.96369	76.83366

Figure 7: Probability of Winning vs Milwagebill (Spanish League)

```
. logit champ milwagebill

Iteration 0:   log likelihood = -19.095425
Iteration 1:   log likelihood = -17.565152
Iteration 2:   log likelihood =  -17.54648
Iteration 3:   log likelihood = -17.546465
Iteration 4:   log likelihood = -17.546465

Logistic regression                             Number of obs     =         30
                                                LR chi2(1)        =       3.10
                                                Prob > chi2       =     0.0784
Log likelihood = -17.546465                     Pseudo R2         =     0.0811
```

champ	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
milwagebill	.0064518	.0039048	1.65	0.098	-.0012015	.0141052
_cons	-2.221764	1.045094	-2.13	0.034	-4.270111	-.1734164

Figure 8: Probability of Winning vs Milwagediff (Spanish League)

```
. logit champ milwagediff

Iteration 0:   log likelihood = -19.095425
Iteration 1:   log likelihood = -16.641856
Iteration 2:   log likelihood =  -16.53608
Iteration 3:   log likelihood = -16.535711
Iteration 4:   log likelihood = -16.535711

Logistic regression                             Number of obs     =         30
                                                LR chi2(1)        =       5.12
                                                Prob > chi2       =     0.0237
Log likelihood = -16.535711                     Pseudo R2         =     0.1340
```

champ	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
milwagediff	.0115968	.0060258	1.92	0.054	-.0002136	.0234072
_cons	.1165765	.5250106	0.22	0.824	-.9124253	1.145578

Figure 9: Points vs Milwagebill vs Idas à Champions (Italian League)

```
. reg pts milwagebill idaàchampions
```

Source	SS	df	MS		
Model	4882.64565	2	2441.32283	Number of obs	= 40
Residual	1962.32935	37	53.0359283	F(2, 37)	= 46.03
				Prob > F	= 0.0000
Total	6844.975	39	175.512179	R-squared	= 0.7133
				Adj R-squared	= 0.6978
				Root MSE	= 7.2826

pts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
milwagebill	.0881318	.0402223	2.19	0.035	.0066337	.1696299
idaàchampions	19.45495	2.516864	7.73	0.000	14.3553	24.5546
_cons	48.68922	5.58458	8.72	0.000	37.37379	60.00466

Figure 10: Points vs Milwagediff vs Idas à Champions (Italian League)

```
. reg pts milwagediff idaàchampions
```

Source	SS	df	MS		
Model	4628.05424	2	2314.02712	Number of obs	= 40
Residual	2216.92076	37	59.9167773	F(2, 37)	= 38.62
				Prob > F	= 0.0000
Total	6844.975	39	175.512179	R-squared	= 0.6761
				Adj R-squared	= 0.6586
				Root MSE	= 7.7406

pts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
milwagediff	.000997	.0419887	0.02	0.981	-.0840802	.0860743
idaàchampions	21.59428	2.708945	7.97	0.000	16.10544	27.08313
_cons	60.3816	2.731259	22.11	0.000	54.84754	65.91565

Figure 11: Probability of Winning vs Milwagebill (Italian League)

```
. logit champ milwagebill

Iteration 0:   log likelihood = -22.493406
Iteration 1:   log likelihood = -16.801738
Iteration 2:   log likelihood = -16.465896
Iteration 3:   log likelihood = -16.464146
Iteration 4:   log likelihood = -16.464146

Logistic regression                             Number of obs     =         40
                                                LR chi2(1)        =      12.06
                                                Prob > chi2       =     0.0005
Log likelihood = -16.464146                     Pseudo R2         =     0.2680

------------------------------------------------------------------------------
       champ |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  milwagebill |   .0557692   .0233145     2.39   0.017     .0100737    .1014647
        _cons |  -9.587609   3.619926    -2.65   0.008    -16.68253   -2.492685
------------------------------------------------------------------------------
```

Figure 12: Probability of Winning vs Milwagediff (Italian League)

```
. logit champ milwagediff

Iteration 0:   log likelihood = -22.493406
Iteration 1:   log likelihood = -16.725097
Iteration 2:   log likelihood = -15.238206
Iteration 3:   log likelihood = -15.104698
Iteration 4:   log likelihood = -15.103649
Iteration 5:   log likelihood = -15.103649

Logistic regression                             Number of obs     =         40
                                                LR chi2(1)        =      14.78
                                                Prob > chi2       =     0.0001
Log likelihood = -15.103649                     Pseudo R2         =     0.3285

------------------------------------------------------------------------------
       champ |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  milwagediff |   .0834263   .0352442     2.37   0.018     .0143489    .1525037
        _cons |   .3693769   .5411446     0.68   0.495    -.6912471    1.430001
------------------------------------------------------------------------------
```

Figure 13: Points vs Milwagebill vs Idas à Champions (French League)

```
. reg pts milwagebill idaàchampions
```

Source	SS	df	MS		
				Number of obs	= 20
				F(2, 17)	= 39.44
Model	2482.72561	2	1241.36281	Prob > F	= 0.0000
Residual	535.024388	17	31.4720228	R-squared	= 0.8227
				Adj R-squared	= 0.8018
Total	3017.75	19	158.828947	Root MSE	= 5.61

pts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
milwagebill	.0993255	.0178199	5.57	0.000	.0617288	.1369222
idaàchampions	9.011841	3.102658	2.90	0.010	2.465804	15.55788
_cons	53.37048	2.566328	20.80	0.000	47.956	58.78496

Figure 14: Points vs Milwagediff vs Idas à Champions (French League)

```
. reg pts milwagediff idaàchampions
```

Source	SS	df	MS		
				Number of obs	= 20
				F(2, 17)	= 9.81
Model	1616.48385	2	808.241924	Prob > F	= 0.0015
Residual	1401.26615	17	82.4274207	R-squared	= 0.5357
				Adj R-squared	= 0.4810
Total	3017.75	19	158.828947	Root MSE	= 9.079

pts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
milwagediff	.0315238	.0271011	1.16	0.261	-.0256547	.0887022
idaàchampions	17.28058	4.326997	3.99	0.001	8.151411	26.40974
_cons	63.76294	3.97528	16.04	0.000	55.37583	72.15004

Figure 15: Probability of Winning vs Milwagebill (French League)

```
. logit champ milwagebill

Iteration 0:   log likelihood = -11.246703
Iteration 1:   log likelihood = -6.3893776
Iteration 2:   log likelihood = -6.1151554
Iteration 3:   log likelihood = -6.1108289
Iteration 4:   log likelihood = -6.1108236
Iteration 5:   log likelihood = -6.1108236

Logistic regression                             Number of obs     =         20
                                                LR chi2(1)        =      10.27
                                                Prob > chi2       =     0.0014
Log likelihood = -6.1108236                     Pseudo R2         =     0.4567

------------------------------------------------------------------------------
       champ |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  milwagebill |   .0228335    .009165     2.49   0.013     .0048704    .0407967
       _cons |  -4.888141   1.801692    -2.71   0.007    -8.419392   -1.35689
------------------------------------------------------------------------------
```

Figure 16: Points vs Milwagebill vs Idas à Champions (German League)

```
. reg pts milwagebill idaàchampions

      Source |       SS       df       MS      Number of obs   =        30
-------------+------------------------------   F(2, 27)        =     21.04
       Model |  3471.0298      2  1735.5149     Prob > F        =     0.0000
    Residual |  2226.83687    27  82.4754395    R-squared       =     0.6092
-------------+------------------------------   Adj R-squared   =     0.5802
       Total |  5697.86667    29  196.478161    Root MSE        =     9.0816

------------------------------------------------------------------------------
         pts |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  milwagebill |   .0580034   .0284433     2.04   0.051    -.0003575    .1163643
idaàchampions |   19.24883   4.196185     4.59   0.000     10.63897    27.85869
       _cons |    43.7131   4.126837    10.59   0.000     35.24553    52.18067
------------------------------------------------------------------------------
```

Figure 17: Points vs Milwagediff vs Idas à Champions (German League)

```
. reg pts milwagediff idaàchampions
```

Source	SS	df	MS		
Model	3593.88075	2	1796.94038	Number of obs	= 30
Residual	2103.98591	27	77.9254042	F(2, 27)	= 23.06
				Prob > F	= 0.0000
				R-squared	= 0.6307
				Adj R-squared	= 0.6034
Total	5697.86667	29	196.478161	Root MSE	= 8.8275

pts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
milwagediff	.0801448	.0327793	2.44	0.021	.0128872	.1474024
idaàchampions	18.13219	4.170853	4.35	0.000	9.57431	26.69008
_cons	58.13202	4.867335	11.94	0.000	48.14507	68.11896

Figure 18: Probability of Winning vs Milwagebill (German League)

```
. logit champ milwagebill

Iteration 0:   log likelihood = -18.325929
Iteration 1:   log likelihood = -13.961694
Iteration 2:   log likelihood = -13.871766
Iteration 3:   log likelihood = -13.871478
Iteration 4:   log likelihood = -13.871478

Logistic regression                             Number of obs     =         30
                                                LR chi2(1)        =       8.91
                                                Prob > chi2       =     0.0028
Log likelihood = -13.871478                     Pseudo R2         =     0.2431
```

champ	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
milwagebill	.0207421	.0084387	2.46	0.014	.0042025	.0372816
_cons	-3.948072	1.367956	-2.89	0.004	-6.629217	-1.266926

Figure 19: Probability of Winning vs Milwagediff (German League)

```
. logit champ milwagediff

Iteration 0:   log likelihood = -18.325929
Iteration 1:   log likelihood =  -13.45485
Iteration 2:   log likelihood = -13.084566
Iteration 3:   log likelihood = -13.080243
Iteration 4:   log likelihood = -13.080241
Iteration 5:   log likelihood = -13.080241

Logistic regression                             Number of obs     =         30
                                                LR chi2(1)        =      10.49
                                                Prob > chi2       =     0.0012
Log likelihood = -13.080241                     Pseudo R2         =     0.2862

------------------------------------------------------------------------------
       champ |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  milwagediff |   .0285716   .0107891     2.65   0.008     .0074254    .0497178
        _cons |   .6373915   .6344311     1.00   0.315    -.6060705    1.880854
------------------------------------------------------------------------------
```

Figure 20: Points vs Milwagebill vs Idas à Champions (English League)

```
. reg pts Dummie2016 idaàchampions milwagebill

      Source |       SS       df       MS              Number of obs =      50
-------------+------------------------------           F(3, 46)      =   15.06
       Model |  3107.51321     3  1035.83774           Prob > F      =  0.0000
    Residual |  3163.76679    46   68.777539           R-squared     =  0.4955
-------------+------------------------------           Adj R-squared =  0.4626
       Total |   6271.28      49  127.985306           Root MSE      =  8.2932

------------------------------------------------------------------------------
         pts |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  Dummie2016 |  -10.0325    4.15254    -2.42   0.020    -18.39113   -1.673867
idaàchampions|  13.96101    2.641277    5.29   0.000     8.644392    19.27762
  milwagebill|  .0401681    .021056     1.91   0.063    -.0022155    .0825516
        _cons |  56.91262    4.689138   12.14   0.000     47.47388    66.35137
------------------------------------------------------------------------------
```

Figure 21: Points vs Milwagediff vs Idas à Champions (English League)

```
. reg pts Dummie2016 milwagediff idaàchampions
```

Source	SS	df	MS		
Model	3013.0047	3	1004.3349	Number of obs	= 50
Residual	3258.2753	46	70.8320717	F(3, 46)	= 14.18
				Prob > F	= 0.0000
Total	6271.28	49	127.985306	R-squared	= 0.4804
				Adj R-squared	= 0.4466
				Root MSE	= 8.4162

pts	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Dummie2016	-8.133684	4.067356	-2.00	0.051	-16.32085	.0534794
milwagediff	.0524046	.0353359	1.48	0.145	-.0187229	.1235322
idaàchampions	13.76455	2.71494	5.07	0.000	8.299656	19.22944
_cons	67.62136	3.033735	22.29	0.000	61.51477	73.72795

Figure 22: Probability of Winning vs Milwagebill vs Idas à Champions (English League)

```
. logit champ milwagebill idaàchampions

Iteration 0:   log likelihood = -23.569674
Iteration 1:   log likelihood = -22.072774
Iteration 2:   log likelihood = -21.974897
Iteration 3:   log likelihood =   -21.9745
Iteration 4:   log likelihood =   -21.9745

Logistic regression                             Number of obs     =         50
                                                LR chi2(2)        =       3.19
                                                Prob > chi2       =     0.2029
Log likelihood =   -21.9745                     Pseudo R2         =     0.0677
```

champ	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
milwagebill	.0066414	.0066216	1.00	0.316	-.0063367	.0196195
idaàchampions	1.40032	1.116833	1.25	0.210	-.7886324	3.589272
_cons	-4.064822	1.811913	-2.24	0.025	-7.616107	-.5135374

Figure 23: Probability of Winning vs Milwagediff vs Idas à Champions (English League)

```
. logit champ milwagediff idaàchampions

Iteration 0:   log likelihood = -23.569674
Iteration 1:   log likelihood = -20.357079
Iteration 2:   log likelihood = -19.940311
Iteration 3:   log likelihood = -19.935613
Iteration 4:   log likelihood = -19.935609
Iteration 5:   log likelihood = -19.935609

Logistic regression                             Number of obs     =         50
                                                LR chi2(2)        =       7.27
                                                Prob > chi2       =     0.0264
Log likelihood = -19.935609                     Pseudo R2         =     0.1542
```

champ	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
milwagediff	.0293496	.0143648	2.04	0.041	.0011951	.0575042
idaàchampions	1.309005	1.150716	1.14	0.255	-.9463568	3.564367
_cons	-1.565564	1.112906	-1.41	0.160	-3.74682	.6156926