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PORTUGUESE FOOTBALL AND THE EFFECT OF COACH EDUCATION ON TEAM PERFORMANCE

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Abstract

The main goal of this thesis is to investigate the impact of football coaches' education on their teams' performance. I collected data from the last eleven years of the Portuguese First Division League. After analyzing the data, I designed an econometric model that can measure a football team's performance concerning the generalized and specialized education. Awareness of the regression of the education factor with OLS combined with having the team and the season in fixed effects, produced results that suggest specialized education is the most important factor for measuring team performance in this particular industry.

Keywords (Football Industry, Education, Team Performance, Manager)

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Index

Table of figures

I. Introduction

"Education is the most powerful weapon which you can use to change the world" (Nelson Mandela 1990). In many studies conducted throughout the years, it is clearly demonstrated that education has a decisive impact on companies and businesses, teams, society, the environment, and many other fields of human activity. Until this point, research has been done on the coach's[1] overall influence on his team's performance, but no studies were ever produced regarding the factor of the coach's education in Portugal. This thesis attempts to fill a gap in empirical research in an industry as unique and specific as football. I investigate whether a coach's education impacts their team's performance and which type of education is more effective, whether generalized or specialized, considering an analysis made in the Portuguese First Division League (PFDL).

The second section of this thesis consists of a general literature review to provide contextualization and perspective over the subject at hand. The third part sheds further light on general and specific aspects of Portuguese Football only to be relevant to the study objective. In the fourth and last section, I will enumerate and describe the empirical strategy adopted and come to fundamental conclusions (section VI) based on the results obtained (section V). The limitations, obstacles, and lack of sources I encountered during my encompassing investigation will also be mentioned in section V. In a way, they testify to my work's relevance and the existing void in this particular field of studies.

Most of the literature I relied on was taken from books, articles, and academic papers published in scientific journals, but I also used non-academic literature, namely news articles from the most prominent Portuguese football organization, the *Federação de Portuguesa de Futebol*

1 I consider the coach as the person responsible for the team, establishing in some parts a parallel with the manager of a company (later on in this thesis I will address the role of the coach)

(FPF), from credible sources and sports newspapers such as "*Mais Futebol*.". The data collected came essentially from *Transfermarkt*, a secure and reliable database often used for football scientific research (Bryson, Frick e Simmons 2012, Pavlovic, Milacic e Ljumovic 2014).

a. Football Industry

Football, known in Canada and the USA as Soccer, has walked alongside humankind's evolution in its many facets and aspects. According to J. O'Brien (2020) in the book" The Professional Practice of Jungian Coaching," football is no longer just a simple game in which 22 players chase a ball and try to score a goal. It has become much more than that. It is a global industry with ties to many other diverse industries: technology in analysis (Carling, Reilly and Williams 2008), medicine in treatments (Waddington and Smith 2000), transportation (Joseph and Clarke 2013), textiles (Kundu 2018), nutrition (Ranchordas, Dawson and Russell 2017), to mention just a few. In Europe, Football is the most popular sport, officially played by more than 4% of the population (256 million registered players), with 5 million referees in more than 200 countries and an estimated 4 billion fans[2].

II. Literature Review

a. How to reach success in the championship?

According to Frick and Simmons (2008), with evidence and statistics gathered from the German league, the Bundesliga, what improves team performance is a combination of management spending and playing talent. It is also referenced that prior coaching and playing experience are essential in determining team performance (Smith and Smoll 2011, Frick and Simmons 2008, Goodall, Kahn and Oswald 2011).

2 World Population Review data, 2021

b. Value squad[3] - playing talent

The European football transfer market is competitive and efficient, a team with high market value is a team with quality; players' prices reflect the players' quality except for young talents: Due to the risk posed by their limited experience at the highest level, they tend to be undervalued (KPMG Football Benchmark 2018). It is evident from several investigations that squad value has a positive correlation with team performance (Schneemann, Muehlheusser and Sliwka 2012). Jürgen Gerhards and Michael Mutz (2016) also refer that team market value is the most important single predictor of team performance. Their article reinforces that the market value of a team does not have the same impact in all the leagues, and the lower the degree of financial inequality in a league, the weaker the effect of squad value on team performance.

c. Coach – Management Spending

As Daniel Beiderbeck et al. (2020), wrote in a McKinsey report, the football industry is unique, money and prestige are important, but the excellent management of the team is of the utmost importance, and it is the most critical asset of a club. The level of management quality, or managerial efficiency, can be measured by comparing the team's actual performance to the highest possible performance (given the quality of its inputs). This factor can be predicted with a reduced error margin by the production frontier (Dawson and Dobson 2002).

Teams with the highest team market value at the beginning of the season achieve the best results because the managerial impact is also of significant relevance in professional sports teams' performances (Bertrand and Schoar 2003, Dawson and Dobson 2002, Bloom, et al. 2014, Lazear, Shaw and Stanton 2012). Scully (1994) reinforces the prior authors stating that a long coach's career and experience in a football club is associated with good sports performance.

3 Another term for Team Market Value

1. Coach's role

From a broad perspective, coaches have similar responsibilities as company managers related to organizing and planning activities, controlling training routines, and leading the team in general (Morrow 2011, Dawson and Dobson 2002). But coaches have a much more stressful management context than company managers because they need to take responsibility for their performance in the short term, dealing with more pressure (Bridgewater 2010). Furthermore, the coach relies on a skillful ability to communicate in a clear, honest, and direct way at all times (Bekiari 2014). Building interpersonal relationships with team members is an essential factor in achieving success in the team. That is where the coach differs from the manager because the last one has a much more distant contact with the employees on a daily basis (Weinberg and Gould 2011).

According to "The Economics of Football" book (2001), economists define coaches as having an essential role in the production process, following the objective of achieving profit maximization (accountable before the club owner) and sporting results (owner and supporters). There are two ways to become a football coach: having a career as a football player and studying without professional football involvement, or both. The career as a professional player usually starts at around 16 years old[4], and that is why many athletes usually stop studying in secondary school, never enrolling in universities, or even completing a bachelor's or master's degree. Football Players typically drop out of school too early, limiting theoretical education. Therefore, most of them are self-taught and learn from the *locker room experience*, which is the opposite of the other path.

Coaches change the behavior of their teams, as the book "Economics of Football" (2001) reveals, relating the case of a team guided by a general, Major Frank Buckley, who implemented

4 The Economics of Football ,2001

his military and disciplined style into the training methods the team, improving the results. The coaches also have control over their players (Kelly e Waddington 2006).

The only condition for a person to be a top head coach, competing in European competitions or the top national leagues, is to have the UEFA PRO License[5] , the highest level of coaching in UEFA[6].

Over the years, the coach's role in the team has been increasingly reduced, with the introduction of Team Managers[7]/Coordinator who organizes the team's travels, booking hotels, checking all other conditions that are not inherent to the game itself (Bridgewater 2010).

a) Education Effect

The labor force is one of the fundamental assets of companies and organizations. Many studies were made and subsequently debated about the impact of education on personal development, companies, countries, and in several areas of the human experience. For example, the growth of organizations after World War II was due to the exponential increase in the education level of the people in the organizations (Griliches e Mason 1972). The qualitative factor of human resources is more decisive for increasing productivity than the quantity of the latter (Denison 1966). Consequently, economies with highly qualified employees have higher growth than economies with employees without the same level of education, so investment in education and knowledge translates into development (Schultz 1961). Youndt et al. (2004) also show that investing in human capital is more efficient than other forms of capital. The technological revolution and automation in organizations meant that people employed for specific tasks decreased dramatically. Benhabib and Spiegel (2005) found that people with more education,

5 The UEFA PRO License is the highest coaching qualification in football. The course is composed of 240 hours, 90 of which are practical. The aim of this license imposed by UEFA in 2003 is to improve the skills needed to effectively manage top-level football teams.

6 Union of European Football Associations

7 courses at Portugal Football School (PFS), the school of the Federação Portuguesa de Futebol (FPF)

higher labor specialization, adapt faster and with less friction to new technologies leading to better growth rates of organizations. Additionally, studies with econometric models suggest that highly educated people significantly affect organizations and the economy as a holistic system (Fuente and Doménech 2010) and, more specifically, on firms (Agiomirgianakis, Asteriou and Monastirioti 2006).

Generalized vs. Specialized Education[8]

Generalized education empowers students to be flexible and to develop or mobilize "soft skills": better communication, problem-solving, acquiring a broad view, engaging in a multidisciplinary approach of themes and topics. Good interpersonal relationships are regarded upon as a potential source of growth in companies, and a healthy working atmosphere among the members is key to the success of an organization (Ni 2006). The goals are more open-ended and diverse, taking more time to achieve the certificate. Advocates of generalized education for a manager claim that the manager needs greater flexibility and social awareness to adapt to change quickly and in complicated environments (Kramer 1975). Based on an analysis of German coaches, Orlowski, Wicker, and Breuer (2016) state that university-level sports sciences contribute to the coaches' success, but nothing about whether it contributed to better team performance.

On the other hand, specialized education is focused on accomplishing specific, well-defined tasks. This type of education usually has a shorter duration and often includes an internship. Proponents of specialized Education argue that as the manager's role has become more complex, the demand has increased for managers skilled at handling large volumes of information through computers, managing and solving problems scientifically rather than by intuition (Kramer 1975).

8 terms used by Hugh E. Kramer (1975)

b) Coach Experience

As stated in the book "Economics of Football" (2001), the coach's experience can be acquired through former playing experience (*locker room experience*) and with the practical empirical experience that is absorbed through years of repeating the same tasks in the same function.

Previous experience as a coach

The manager's experience allows them to be more prepared for quickly interpreting situations in a better way than the mere fact of possessing an academic background does. So, the more experienced manager is more likely to achieve better organizational performance than a manager who relies solely on his academic competencies (Barker e Mueller 2002). Ffurthermore, Robert Huckman et al. (2008) found that, for example, years of experience in a company of an individual team member does not influence performance, but that same amount of experience in a specific function of that team member, is associated with better performance.

Former player- locker room experience

After abandoning their activity, most elite athletes want to pursue their careers linked to the sport that gave them notoriety (Gilbert, Côté e Mallett 2006). The literature proposes and confirms that managing and coaching a team requires various pre-existing skills in coaches, which can be mobilized and developed through high-level playing experience (Orlowski, Wicker and Breuer 2016). A coach who has been an elite athlete understands the sport, the athletes' attitudes and behavior, the routines, and has more winning experience (Rynne 2017). In addition to that, an important factor to increase the coach's efficiency and thus achieve better results is already being experienced as a former player and possessing coaching education (Gilbert, Côté e Mallett 2006) and evidenced in the US professional Basketball (Goodall, Kahn and Oswald 2011). More accurately put: Years of professional experience as a former player can contribute to improving sport-specific technical and tactical skills and the level of "organizational socialization" (Purdy and Potrac 2016).

III. Portuguese Football Context

A. Talent exporting clubs (coaches and players)

Although Portugal is one of the poorest countries in Europe and one of the least populated[9], it has a disproportionate influence regarding the creation of talent in football academies, mainly in Benfica, Porto, and Sporting[10]. As Benfica's CEO, Domingos Soares de Oliveira, wrote in the 2020 annual report of Benfica Sad[11]: "People know our players won't be cheap because we have a good track record (…) Once we sell them, we want them to be successful. If one player fails once we sold them, then it's something that will affect our brand.". The PFDL has particularities compared to other European leagues, the Portuguese clubs are exporters and not importers, as shown in Table I.

Table 1 - Total transfers between 2005 and 2020 (Transfermarkt,2021)

Football Team	Player Signings	Player Exits	Revenues (millions)	Expenses (millions)	Balance (millions)
SL Benfica	588	576	1 200 M €	602.34 M €	594.99 M €
FC Porto	553	550	1 050 M €	541.31 M €	507,46 M €
Sporting CP	510	501	548.19 M €	309.43 M €	238.76 M €
SC Braga	513	502	268.22 M €	78.82 M €	189.41 M €
Vitória SC	370	365	107.07 M €	23.82 M €	83.25 M €

According to *transfermarkt*, from 2005/2006 until 2020/2021, Benfica football club had the highest revenues worldwide, Porto ranked 8th, and Sporting came in at 26th. When it comes to expenses, Benfica is in the 29th position, Porto ranks 33rd, and Sporting ranks 63rd. This data only solidifies and attains to the exporting part of the PFDL clubs.

9 The World Bank, 2021

10 Sport Lisboa e Benfica, Futebol Clube do Porto and Sporting Clube de Portugal, respectively

11 Sport Lisboa e Benfica company

Regarding the balance between revenue and expenses, in Europe, Benfica and FC Porto are respectively in the first and second positions. Sporting appears in the eighth position and SC Braga in the twelfth position. Portugal is not a destination country for the best known and most talented players in Europe that are eventually transferred to more competitive leagues in other championships (England, Spain, France) because Portuguese clubs are unable to keep the players for financial reasons. The departure of João Félix (product of the Benfica's academy) to Atlético de Madrid for €126 million[12] was the most recent example to illustrate this tendency. Also, in exports, according to the ranking of the CIES[13] (2021), Portugal is the sixth-largest exporter of coaches in the world, with a total of 25 coaches working abroad, and in the PFDL, only 11.1% of coaches are foreigners, which demonstrates the quality of Portuguese coaches and that Portuguese clubs prefer to invest in national coaches to achieve their goals (Table V, in appendix).

B. Portuguese First Division League

The Portuguese First Division League is a professional league where all clubs are guaranteed a minimum of preset conditions to achieve good results. The top of the league table is usually a *3way* competition for first place, always disputed by the same clubs Porto, Benfica, and Sporting. For the first time since 1946, a team won the PFDL without belonging to one of the top three big clubs in Portugal (Benfica, Porto, Sporting), it was Boavista FC, a club from the city of Oporto, that made history in 2001.

Regarding the market value of the squad: there are four teams with very high squad values (Benfica, Porto, Sporting, and SC Braga) and one transition team (Vitória SC) whereas the rest of the teams are very similar, which promotes a massive struggle for the fifth place and by the

12 A Benfica statement passed on to the Portuguese Securities Market Commission (CMVM) and later released by the same entity.

13 International Center for Sports Studies

end of the season, it is highly unpredictable which clubs are going to be relegated to the second league.

IV. Empirical Strategy

A. Data Collection and Descriptive Analysis

I collected all available data from the PFDL manually, but I stumbled upon the absence of parameters for all variables before 2010. The database contains a total of 69 coaches, from 24 football teams in the time interval of 11 years, from 2010 to 2020, 4333 football matches, including a total of 156 observations. I considered that the year the season started is the corresponding year in the database to have a consistent correspondence. For example, the 2005/2006 season is registered as the year 2005.

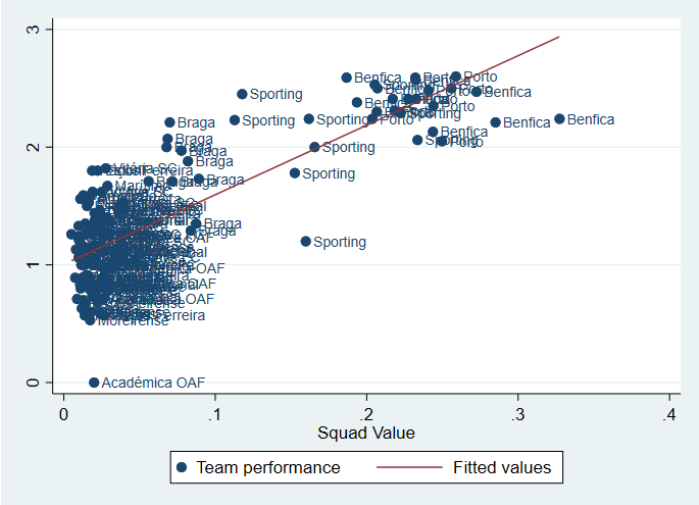
Database variables description:

Coaches: The database does not include interim coaches (with 4 or fewer matches in the club), nor coaches that did not start seasons for the following reasons: Coaches that do not start their seasons do not organize the team according to their wishes; and for the fixed effects model to work (overcoming the collinearity problem). So, for each coach is associated with one team each season, the opposite is true. Moreover, as it becomes evident in the Italian first league, Serie A, the change of coach does not have a positive effect on the team and its sporting performance (de Paola e Scoppa 2012).

Team Performance: To measure the team's performance, I used each coach's average points per game per season. It should be noted that the number of teams per season was different in the seasons mentioned in the database, and therefore the number of games in each season was also different. Between 2010 and 2013, inclusively, each team played 30 matches and in the other years 34 matches, affecting the average points per game of the teams. Promotion and

relegation play-offs in the PFDL and Portugal's cup are not included in the data as these competitions have a different format. Moreover, Team Performance will be the dependent variable in all the models created.

Squad value: Taken from *transfermarkt* at the start of the season (August 1st each year) except for the 2014/2015 season where data was only available from the beginning of the season on October 23rd. The variable in the dataset is also adjusted to the total value of the football teams squads in each season, mainly to balance out the increase in squad values from season to season with "football players prices' inflation"[14]. Much of the literature states that squad value has a positive impact on team performance, analyzing the PFDL data, the value of the squad at the end of the season has a significant, strong, positive, and causal relationship with team performance (This can be explained by the successive valuations of the players throughout the season, a team with good performance values its assets). Additionally, analyzing the value of the squad at the beginning of the season, it is also evident that there is a correlation with the team's performance (graph 1).



Graph 1 – Correlation between team performance - squad value adjusted to the total squad values of the season at the beginning of the season (Transfermarkt,2021)

14 According to CIES Football Observatory, player prices have been increasing year after year

Considering the interval of seasons between 2010/2011 and 2020/2021, in five of those years (almost half the times), the team with the highest squad value at the beginning of the season did not win the championship title in the PFDL. There are plenty of examples of teams that didn't finish in the position corresponding to the ranking of their squad value. When looking, for instance, at the 2020/2021 season, Rio Ave's squad value was the 6th highest, but they were the third-worst performing team in the PFDL, being relegated from the first division. Or even Paços de Ferreira, who was placed 5th in the league but was 11th in terms of squad value, gaining access to European competitions (Conference League). Table II shows some disparities between squad value and the championship's outcome, which is one of the things that makes up for the magic and beauty of the game. The sport would lose its unpredictability if the teams with more financial resources always won. In these cases, the success of winning the PFDL is not due entirely to the value of the squad, but most of it is due to the coach.

Table 2 -Portuguese Football Club Champion and his Team value rank at the beginning of the season (transfermarkt,2021)

Football Team	Season	Team Value Rank
Sporting	2020/2021	3
Porto	2019/2020	2
Benfica	2016/2017	2
Benfica	2015/2016	3
Benfica	2014/2015	2

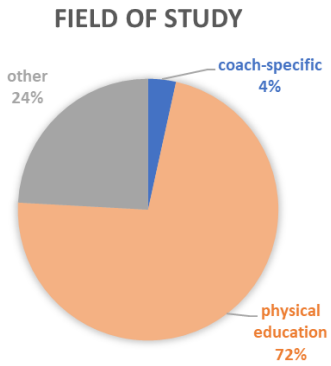
Education: As previously mentioned, there are two types of education: generalized and specialized education. As generalized education, I consider the academic level of the degree in university that each coach has achieved and the number of years of schooling. I tested the model both with a dummy variable and a continuous variable, respectively:

○ Dummy variable of the coach's education when the coach has an academic degree such as bachelor's, master's, or Ph.D.

○ Continuous variable: Number of years of education. I consider a bachelor's degree to be three years, a Master's degree two years, and a Ph.D. four years. I also depart from the fact

that university education is cumulative, so no one gets a master's degree without earning a bachelor's degree, nor a Ph.D. without a master's degree. Hence, and by that order, I considered the number of years of Ph.D. equal to 9 years, master's equivalent to six, and bachelors equal to three.

The vast majority of the coaches in my database obtained graduation in the sports area (72%). Interestingly, the remaining 24% have another type of educational background, unconventional, but that does not limit them when it comes to being a coach (graph 2).



Graph 2 – Coaches educational background according to the field of studies

As specialized education for coaches, I consider a dummy variable that indicates if the coach has the UEFA PRO license.

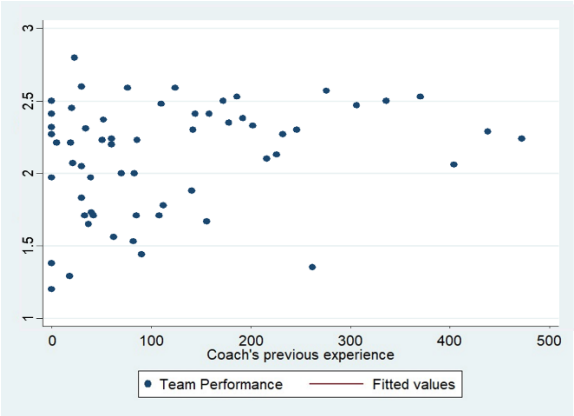
Potential experience: created by Jacob Mincer (1974)[15], the formula (age – number of years of education - 6), "years of potential labor market experience" one must infer exogenously, so the potential experience must also be exogenous.

Coach experience: I consider as experience only games in the PFDL as it is different from other leagues mentioned in section III. This league is unlike any other competition because

15 Jacob Mincer in his book "Schooling, Experience, and Earnings", refers for the first time this potential experience term when he elaborate a "human capital earnings function" model.

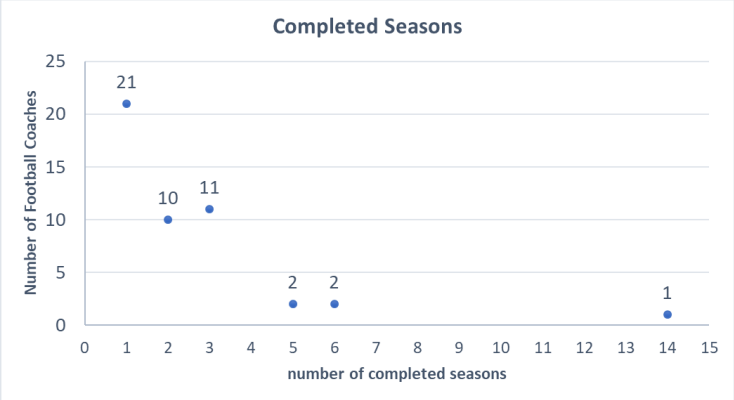
it is considered a long-term competition without elimination matches. Therefore, I did not include any matches in cups and European competitions.

As displayed in graph 3, it can be inferred that the more experience a coach has (number of matches in PFDL), the higher the coach's average points per game are. Coaches with more than 200 games generally have more than 2 out of 3 (average points per season).



Graph 3 – Correlation between team performance and coach´s experience, season 2005/2006 to 2020/2021 (Transfermarkt,2021)

Only 49 coaches out of the total 133 observed in the interval 2005/2006 to 2020/2021 completed at least 1 season, graph 4, in the same club (only 110 observations out of 470).



Graph 4 – Amount of coaches that completed a whole season between 2005/2006 and 2020/2021 (Transfermarkt,2021)

Therefore, data is unbalanced, only Braga, Sporting, Marítimo, Porto, and Benfica remained in the first league in the 15 years of analysis. Clubs such as CF União and Farense were relegated

to the second league in the same season they moved up, being in Portugal's most important league for one year only.

Table III shows the different variables and a brief description of each one.

Table 3 -Variables Brief Description

Variable	**Brief description**
Team Performance	Average Points Per Game of the coach
University Education	Dummy Variable (1= if the coach has university education)
UEFA PRO license	Dummy Variable (1= if the coach has the UEFA PRO license)
Potential Experience	Coach's age – number of education years - 6
Years of University Education	Number of years of coach's education
Former Player	Dummy variable (1 = If the coach was a professional football player)
Previous Experience	Total games of the coach in the PFLD
Squad Value	Squad Value / Value of all squads in each season
Favorite Lineup	Coach's Favorite Lineup

B. Models

A simple solution to control for individual club heterogeneity is to design a fixed-effects model. To estimate the impact of coach education, I used an ordinary least squares regression (OLS) with team and season fixed effects. Also, each coach is only associated with one football team each year. I controlled the model with some variables to avoid biased estimates because more factors influence the team's performance, aiming to analyze the isolated impact of the coach education on the team performance. To have robust results, I created five models, each of them containing different characteristics and controls: (I) - with university education measured through a dummy; (II) - with a continuous university education variable (number of years of education of each coach); (III) - with potential experience instead of previous experience (total games); (IV) - without observations from the four football clubs with the highest (and disproportionate) squad value in my database; and finally (V) – a model with only observations

in which coaches have not completed the whole season. Using this approach, it is possible to interpret each coefficient and draw interesting conclusions from the regression results.

I analyze the impact of the education level of PFDL coaches on team performance. Thus, the null hypothesis are:

(1)H0: Coach's Generalized Education has no impact on the team performance of PFDL teams.

(2)H0: Coach's Specialized Education has no impact on the team performance of PFDL teams.

The models I created to estimate this impact are:

Model I:

(I) $$Team\ Performance_{it} = \beta_0 + \gamma_1 Previous\ Experience_{it} + \gamma_2 University\ Education_i + \gamma_3\ UEFA\ PRO\ license_{it} + \gamma_4\ Former\ Player_i + \beta_1 Squad\ Value_{it} + \gamma_5\ Favorite\ Lineup_i + e_{it}$$

Model II:

Changing the education dummy variable from the previous model to a continuous education variable (number of years of education). With the same hypothesis as in the last model.

(II) $$Team\ Performance_{it} = \beta_0 + \gamma_1 Previous\ Experience_{it} + \gamma_2 Years\ of\ University\ Education_i + \gamma_3\ UEFA\ PRO\ license_{it} + \gamma_4\ Former\ Player_i + \beta_1 Squad\ Value_{it} + e_{it}$$

Model III:

Measuring the experience of the coach through potential experience:

(III) $$Team\ Performance_{it} = \beta_0 + \gamma_1 Potential\ Experience_{it} + \gamma_2 University\ Education_i + \gamma_3\ UEFA\ PRO\ license_{it} + \gamma_4\ Former\ Player_i + \beta_1 Squad\ Value_{it} + e_{it}$$

Model IV:

Portuguese football teams in terms of squad value, are very disproportional that can be seen in graph 1, also the range of squad values in all observations is huge (5.1 to 314.7 million).

Because of that, in the fourth analysis, I did the regressions in the same way, OLS with team and season fixed effects, however, I chose to remove the four teams with the highest squad value from the equation (Benfica, Porto, Sporting, and Braga).

(IV) $$Team\ Performance_{it} = \beta_0 + \gamma_1 Previous\ Experience_{it} + \gamma_2\ University\ Education_i + \gamma_3\ UEFA\ PRO\ license_{it} + \gamma_4\ Former\ Player_i + \beta_1 Squad\ Value_{it} + e_{it} \quad (without\ Benfica, Porto, Sporting\ and\ Braga)$$

Model V:

Many factors justify the administration's choice to keep a coach for the whole season. The main one is the satisfaction of the owner/president/shareholders of the club both during the season however the long-term project and vision for the future also play an important role. Other motives may be related to contract rescissions and expenses. So, I created a model that only monitors coaches' observations that have not completed a full season, which implies that the coach's performance was not satisfying for these parties (owner/president/shareholders).

(V) $$Team\ Performance_{it} = \beta_0 + \gamma_1 Previous\ Experience_{it} + \gamma_2\ University\ Education_i + \gamma_3\ UEFA\ PRO\ license_{it} + \gamma_4\ Former\ Player_i + \beta_1 Squad\ Value_{it} + e_{it}$$

V. Results

The results obtained from the regressions of the models described above are summarized in Table IV. Please consult the appendix with tables with the appropriate identification for a more in-depth interpretation.

Table 4 - Summary of the regression of the five models

Team performance	**Xtreg fe**				
	I	II	III	IV	V
University Education	.0653		-.0192	-.0190	-.0216
	(0,0671)		(.0632)	(.0629)	(.0986)
Years of University Education		-.0066			
		(.0129)			
UEFA PRO license	.1060****	.1277**	.1200***	.1222****	.2379*

	(0,0736)	(.0762)	(.0747)	(.0759)	(.1040)
Former player	.1323**	.0795	.0863	.0876	.0834
	(0,0719)	(.0730)	(.0717)	(.0716)	(.0879)
Previous Experience	-.0003	-.0001		-.0001	-.0008**
	(0,0003)	(.0003)		(.0003)	(.0004)
Squad value	-.5121	-.3977	-.4185	-.3819	-2.6805
	(1.6090)	(1.5258)	(1.5052)	(1.526)	(4.7457)
Potential Experience			-.0015		
			(.0038)		
4231 line-up	.2693**				
	(.0964)				
4141 line-up	.2395**				
	(.1340)				
4132 line-up	.3892**				
	(.1534)				
343 line-up	.2903**				
	(.1070)				
433 line-up	.2487**				
	(.1053)				
442 line-up	.3607**				
	(.1286)				

* p-value significant at 5%,,**p-value significant at 10%, ***p-value significant at 11%, ****p-value significant at 15%

Interpreting the results obtained in successive regressions:

Model 1 – Table 6

University education (generalized education) dummy variable is without significance (p-value is high), so the null hypothesis(1) that Coach's generalized education has no impact on team performance cannot be rejected. Moreover, the coach's university education has an insignificant relationship with minimal effect on team performance with the coach's favorite lineup as controls, and becomes less significant as controls are removed from the model (-0,019, -0,0187, -0,0108, and -0,043). Meaning that if the coach has university education, the team's performance varies between -0,0432 and 0,0653, which is irrelevant in this context. On the other hand, having a UEFA PRO license (specialized education) and being a former player (*locker room experience*) have significance and a positive causality relationship with team performance (with all variables in equation I). Specialized education is the unique

variable that is consistently significant, positively impacting team performance, allowing to reject the null hypothesis (2). Coaches with license UEFA PRO have better team performance, around 0.1060 and 0.1222. The previous experience of the coach (total number of matches in PFDL) does not appear to have any significance or impact on team performance.

Model 2 – Table 7

This model is a bit worse than the previous one, education is measured as a continuous variable associated with the number of years of education in university, and still insignificant, the p-value remains high. Furthermore, the null hypothesis (1) that university education has no impact on team performance cannot be rejected. With the coefficient analysis, we realized that the number of years of education has a more negligible effect on team performance than the previous model. By increasing one year of education, the team's performance decreases between 0.0066 and 0.062, which is irrelevant in this context. However, having a UEFA PRO license continues to have significance, and a positive relationship with team performance, the null hypothesis (2) can be rejected. Moreover, coaches with specialized education have better team performance, around 0.1170 and 0.1277. Additionally, coach's experience is not significant, and as in the last model coach's previous experience is irrelevant to estimate team performance.

Model 3 – Table 8

There are no major changes concerning the results of the previous models. Potential experience and university education continue to be insignificant and irrelevant in the analysis of the team's performance (the null hypothesis (1) cannot be rejected). Moreover, UEFA PRO license remains significant and with a positive effect on team performance. Accordingly, the null hypothesis (2) can be rejected, presuming that specialized education has an impact on team performance.

Model 4 – Table 9

With the four major Portuguese football clubs removed from the model and all teams having similar squad values, the university education variable still has no significance (p-value is very high). Moreover, the null hypothesis (1) that generalized education has no impact on team performance cannot be rejected and seems to have a negative relationship with very little effect (between -0.0432 and – 0.0108) and is considered non-relevant. Conversely, like the previous models, having a UEFA PRO license has significance and a positive causality relationship with team performance (between 0.1088 and 0.1222), dismissing the null hypothesis (2).

Model 5 – Table 10

Disregarding coaches' observations who have not completed their respective seasons, I collected very similar results to the previous models. University Education is still insignificant, the p-value remains very high. The null hypothesis (1) that generalized education has no impact on team performance cannot be rejected. Through coefficient analysis, generalized education doesn't have a relevant effect on team performance. However, having a UEFA PRO license reinforces the significance of the previous models and positively affects team performance. Coaches with specialized education have better team performance, around 0.1702 and 0.2379.

VI. Conclusion

My goal when I first started compiling data was to try to determine if education has an impact on the team performance, in a specific industry like football, limiting my research to Portuguese First Division League. Portuguese football displays one-of-a-kind characteristics and peculiarities that do not surface in any other country. Based on the general literature, education has a positive effect on achieving better performances. I divided education into generalized (university degrees) and specialized in the sense that is specifically designed for football, having a coaching degree (UEFA PRO license). Education in the form of an academic degree is more oriented towards general skills, applicable to any professional activity. On the other hand, specialized education is associated with specific skills of each job, in this case specifically related to being a coach. To prove a robust result on whether or not specialized or generalized education has an impact on team performance, I made several variations of the models, removing and adding controls. After my research based on Portuguese football data, the results indicated that in a very consistent way, with all model variations, that the variable coefficient that I characterized for generalized education never changed much, thus dismissing any relevant impact on team performance. This leads me to conclude that generalized education in this context and in this industry does not have a very large effect on team performance, so it can be rejected that it has a large effect, but it cannot be rejected that it is not zero. On the opposite side, the variable that characterizes specialized education has consistent significance and a positive impact on team performance, leading me to conclude that in the Portuguese football context, specialized education is the most relevant factor. Another relevant variable with significance and impact which is worth mentioning in this context, is whether the coach was a former professional player. This shows that the Football industry has peculiarities in how better performance is reached. The *locker room experience* and specific coach courses (specialized education) are more important than a bachelor's, a master's, or a PhD in general sports-related

areas. In Germany, some universities are already completely coach-oriented. Portugal could also invest in this field of expertise, beyond the mandatory coach license.

I stumbled upon other interesting findings like the level of experience included in the research. The coach's experience and the potential coach's experience were not significant or had a relevant impact for a better performance. Naidenova et al. (2015) had the same results pertaining to the Top 5 European Football Leagues.

A. Limitations

There are some limitations to the empirical strategy that was created. First of all, and with respect to the database, comes the small number of observations, being that the study was done only in the PFDL, and I had to remove observations of coaches that did not start their seasons due to collinearity problems. Furthermore, squad value data for the large majority of clubs is only available from 2010 up until today. However, clubs like: Beira-Mar, UD Leiria, CD Aves, CF Estrela, Olhanense, Naval and CF União only had their squad value determined at the end of the seasons, so I removed these observations as not to create wrong analysis. Also, only 36% of the coaches' observations were university-educated, limiting the investigation's variability.

Another handicap in the research was that I did not consider unique characteristics of each match, such as home and away matches, thus considering the strength of fan support in stadium, which according to Pollard (2008) is an important factor in the outcome of the match.

Finally, it is always dubious to distinguish the manager's contributions and the employees to the good results of a company. Much like what happens in companies the same phenomenon can occur in football clubs when it comes to the coach and the football players. It is possible to attribute merits to the coach when these are the players' merits.

VII. References

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VIII. Appendix:

Table 5 - Transfers with Portuguese coaches until 2021 (CIES,2021)

Football Manager	Age	Revenue (Millions)	Players sold
Leonardo Jardim	44	917.96	53
José Mourinho	56	567.32	53
Jorge Jesus	64	516.76	90
Rui Vitória	48	405.75	48
André Vilas-Boas	41	295 .23	37

Table 6 - Effect of Education on Team Performance, accounting for former player, coach experience, squad value, favorite lineup (Model I)

Team performance	**Xtreg fe**				
University Education	.0653 (0,0671)	-.0190 (.0629)	-.0187 (.0627)	-.0108 (.0607)	-.0432 (.0550)
UEFA PRO license	.1060*** (0,0736)	.1222** (.0759)	.1216 ** (.0756)***	.1088 (.0715)	.1176* (.0713)
Former Player	.1323* (0,0719)	.0876 (.0716)	.0878 (.0713)	.0891 (.0711)	
Previous Experience	-.0003 (0,0003)	-.0001 (.0003)	-.0002 (.0003)		
Squad Value	-.5121 (1.6090)	-.3819 (1.526)			
4231 line-up	.2693* (.0964)				
4141 line-up	.2395* (.1340)				
4132 line-up	.3892* (.1534)				
343 line-up	.2903* (.1070)				
433 line-up	.2487* (.1053)				
442 line-up	.3607* (.1286)				

*p-value significant at 10%, **p-value significant at 11%, ***p-value significant at 15%

Table 7 - Effect of Education on Team Performance, accounting for former player, squad value, coach experience (Model II)

Team Performance	**Xtreg fe**		
Years of University Education	-.0066	-.0064	-.0062
	(.0129)	(.0129)	(.0128)
UEFA PRO license	.1277*	.1209*	.1170**
	(.0762)	(.0738)	(.0730)
Former player	.0795	.0781	.0783
	(.0730)	(.0727)	(.0725)
Squad value	-.3977	-.5937	
	(1.5258)	(1.4301)	
Previous Experience	-.0001		
	(.0003)		

*p-value significant at 10%, **p-value significant at 11%, ***p-value significant at 15%

Table 8 - Effect of Education on Team Performance, accounting for former player, squad value, and coach potential experience (Model III)

Team Performance	**Xtreg fe**
Education University	-.0192
	(.0632)
UEFA PRO license	.1200**
	(.0747)
Former player	.0863
	(.0717)
Squad value	-.4185
	(1.5052)
Potential experience	-.0015
	(.0038)

*p-value significant at 10%, **p-value significant at 11%, ***p-value significant at 15%

Table 9 - Effect of Education on Team Performace, accounting for former player, squad value, and coach experience (Model IV)

Team performance	**Xtreg fe without Benfica, Porto, Sporting and Braga**			
Education University	-.0190	-.0132	-.0108	-.0432
	(.0629)	(.0612)	(.0607)	(.0550)
UEFA PRO	.1222***	.1130***	.1088***	.1176*

license	(.0759)	(.0724)	(.0715)	(.0712)	
Former player	.0876 (.0716)	.0884 (.0713)	.0891 (.0711)		
Squad value	-.3819 (1.526)	-.5913 (1.4366)			
Previous Experience	-.0001 (.0003)				

*p-value significant at 10%, **p-value significant at 11%, ***p-value significant at 15%

Table 10 - Effect of Education on Team Performace, accounting for former player, squad value, and coach experience (Model V)

Team performance	**Xtreg fe only with coaches that have not completed a full season**				
Education University	-.0216 (.0986)	.0075 (.1000)	.0065 (.0989)	-.0309 (.0915)	
UEFA PRO license	.2379* (.1040)	.1775** (.1016)	.1777** (.1004)	.1834** (.1003)	.1702** (.0915)
Former player	.0834 (.0879)	.0888 (.0904)	.0894 (.0893)		
Squad value	-2.6805 (4.7457)	-1.1961 (4.8096)			
Previous Experience	-.0008** (.0004)				

* p-value significant at 5%,,**p-value significant at 10%, ***p-value significant at 11%, ****p-value significant at 15%

Table 11 - Isolated impact of variables in team performance with all observations

Team Performance	
Generalized Education	
Education University	-.0208
	(.0537)
Years of Education in university	-.0065
	(.0109)
Bachelor's	.0385
	(.0648)
Master's	-.1036
	(.0790)
PhD	-.0004
	(.1312)
Sport-related	.0671
	(.1738)
Non-Sport-related	.0390
	(.0609)
Specialized Education	
UEFA PRO license	.1038***
	(.0690)
	*** *15 % of significance*