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ESSAYS IN SPORTS ECONOMICS AND MANAGEMENT: COMPETITIVE BALANCE, MINORITY GROUPS, AND WORKPLACE ISSUES

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COMPETITIVE BALANCE, MINORITY GROUPS, AND WORKPLACE ISSUES

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Declaration

This doctoral dissertation is a presentation of an original work to the University of Castilla-La Mancha (UCLM) in candidacy for the degree of Doctor of Philosophy. The references to other authors' contributions are properly cited in the literature, and the manuscript acknowledges collaborative research and comments.

The doctoral work was done under the supervision of PhD Julio del Corral (University of Castilla-La Mancha) and PhD Cornel Nesseler (University of Zurich) at the Department of Economic Analysis and Finance (UCLM), Ciudad Real, Spain.

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Abstract

The context of professional sports is relevant for research in economics and management for a considerable number of reasons. The dissertation analyzes this context in two different ways.

First, the dissertation identifies the (complex) economic structure of professional leagues, which determines the opportunities of teams to be successful. To analyze competitive balance, the first paper provides a graphical method based on data from the betting market. The results capture the singularities of competitive balance and the potential influence of economic regulations in the Major League Soccer in the United States.

Second, the dissertation examines the existence of biases against leaders from minority groups in the sports workplace. The second paper demonstrates that performance differences between men and women coaches do not exist in top European women's soccer leagues, which challenges traditional gender stereotypes. The third paper focuses on the race of head coaches in professional basketball in the United States; and shows that race is a significant determinant of dismissal.

The methods and findings have implications for policy recommendations and research. The general discussion emphasizes the advantages of the context and notes opportunities for future studies in both strands of literature.

Resumen

El deporte profesional es un contexto relevante para la investigación en economía y gestión del deporte por distintas razones. La tesis utiliza este contexto de dos formas diferentes.

Primero, la tesis considera la estructura económica (compleja) de las ligas profesionales como un determinante de las posibilidades de éxito de los equipos. Para analizar el balance competitivo dentro de esta complejidad, el primer artículo presenta un método gráfico desarrollado a partir de datos de casas de apuestas. Los resultados capturan las singularidades del balance competitivo y la potencial influencia de regulaciones económicas en la Major League Soccer en Estados Unidos.

Segundo, la tesis investiga la existencia de sesgos en contra de líderes procedentes de grupos minoritarios en el deporte. El segundo artículo demuestra que no existen diferencias en el rendimiento de entrenadores y entrenadoras en ligas europeas de fútbol femenino de élite. Este resultado contradice prejuicios de género preexistentes. El tercer artículo se centra en la raza de los entrenadores de la liga profesional de baloncesto en Estados Unidos y muestra que el factor racial tiene una influencia significativa en los despidos.

Los métodos y los hallazgos tienen implicaciones para la implementación de políticas de gestión y la investigación. La discusión final enfatiza las ventajas del contexto deportivo y sugiere oportunidades para contribuir a la literatura en ambas líneas.

Contents

1	Introduction	1
1.1	The economics of sports as a unique setting	2
1.1.1	Competitive balance in professional sports leagues	3
1.2	The economics of sports as a laboratory	6
1.2.1	Gender issues and stereotypes in the workplace	8
1.2.2	Racial biases in the workplace	11
1.3	References	15
2	Prospective analysis of competitive balance	23
2.1	Introduction	24
2.2	Literature review and contextual setting	25
2.3	Data and methodology	28
2.4	Results and discussion	32
2.5	Conclusions	37
2.6	Appendix	38
2.7	Publication and acknowledgements	39
2.8	References	40
3	Performance of coaches in European women's soccer leagues	45
3.1	Introduction	46
3.2	Theoretical framework	48
3.2.1	Social categorization	49
3.2.2	Similarity/attraction	49
3.2.3	Group faultlines	50
3.3	Literature review	51
3.4	Data and methodology	54
3.4.1	Sample and data collection	54
3.4.2	Method and variables	57
3.5	Results	59

3.6	Discussion and conclusions	61
3.6.1	Managerial implications	65
3.6.2	Concluding remarks	66
3.7	Publication and acknowledgements	67
3.8	References	67
4	Racial differences in the labor market. NBA head coaches	75
4.1	Introduction	76
4.2	Literature review	77
4.3	Data description and methods	80
4.4	Results	85
4.4.1	Further analyses	90
4.5	Discussion	93
4.6	Conclusions	96
4.7	Appendix 1	97
4.8	Appendix 2	100
4.9	Publication and acknowledgements	103
4.10	References	103
5	General discussion	109
5.1	Graphical approach to competitive balance	109
5.2	Minorities in influential labor positions	112
5.2.1	The case of women head coaches	112
5.2.2	The case of black head coaches	116
5.3	References	119
6	Conclusions	125
7	Conclusiones	127

List of Figures

2.1	Balanced (example 1) vs. imbalanced (example 2) competitions . . .	31
2.2	Density functions of teams' expected points (4-year period)	32
2.3	Density functions of teams' expected points	34
2.4	Standard deviation of expected and actual points	35
2.5	Average probability of winning by team	38
3.1	Share of women coaches in the European leagues (2000-2017)	56
4.1	Evolution of the percentage of games coached by race	82
4.2	Effectiveness of coaches	83
4.3	Marginal effects of the probability of dismissal for black head coaches (dependent on effectiveness)	89
4.4	Probability of the potential wins. 3 games	99
4.5	Probability of the potential wins at the end of the season	99

List of Tables

2.1	Regression analysis. Dependent variable: attendance figures	36
3.1	Summary statistics of the sample by country	55
3.2	Regression analysis. Dependent variable: points per game	60
4.1	Descriptive statistics	85
4.2	Contingency table: dismissal and quit by race	85
4.3	Contingency table between former NBA player and head coach by race	86
4.4	Contingency table between coach effectiveness and dismissal	86
4.5	Relationship between dismissals and effectiveness by race	87
4.6	Probit regression results	88
4.7	Robustness checks probit regression results: black dummy	91
4.8	Robustness checks probit regression results: performance -continuous variables	92
4.9	Probability of outcome. 3 games	98
4.10	Probability of potential wins. 2 games	98
4.11	Probability of potential wins. 3 games	98
4.12	Coaches, race, and number of games	101
4.13	Coaches, race, and number of games (continued)	102

Chapter 1

Introduction

This doctoral dissertation aims to contribute to the literature on sports economics and management from two different perspectives. First, the dissertation considers sports as a unique economic setting with a complex structure and multiple agents. In this way, we implement a novel approach to analyze competitive balance, which is essential in the organization of professional sports leagues. Second, the dissertation conceives sports as a setting that provides empirical advantages to understand broader economics issues, which are not often possible to investigate in other industries. Specifically, this research focuses on the racial and gender differences that we observe in influential positions of the sports labor market. The contribution to both strands of research has managerial implications and provide opportunities for future research.

The rest of the document is organized as follows. The next introductory lines complement the above-mentioned ideas and explain in detail the contributions of the chapters to the literature. Chapter two includes a novel graphical approach to the analysis of competitive balance in professional sports leagues. Chapter three uses data on team performance to analyze gender differences in coaching positions in European soccer. Chapter four calculates the efficiency of coaches in professional basketball to examine racial differences in labor conditions. Chapter five discusses the general findings, limitations, and opportunities for future research. Finally, Chapter six concludes the dissertation.¹

¹Every chapter includes its own list of references to facilitate the reading.

1.1 The economics of sports as a unique setting

The importance of sports as an economic setting is a recurrent question (Zimbalist, 2003). In part, the answer relies on the contribution of sports to countries' gross national product. For example, the sports sector accounts for more than 2% of total GDP and almost 3% of employment in the EU countries (European Commission, 2019a). In Spain, this sector accounts for 1.44% of total GDP and 1.5% of employment (Bosch, Murillo, & Raya, 2019) and its outreach determines a great number of manufactured goods, tourism activities, specific jobs, and facilities (Ministerio de Educación, Cultura y Deporte, 2018). However, exclusively using this argument to answer such a question would be a rather simplistic approach.

Beyond the impact of sports on the economies of countries, Sandy, Sloane, and Rosentraub (2004) mention two points that define the importance of sports in the economic literature. First, sports is a thousand-year-old tradition, to which all societies devote a great deal of time and attention. People care so much about sports that international game outcomes can even affect investors mood and stock returns (Edmans, García, & Norli, 2007). Second, the agents and relationships that sports activities involve, e.g., seller-consumer, coach-player, or manager-employee, rise interesting economic questions (Kahn, 2000).

Academics have published papers on sports economics that aim to provide answers to these questions since the 1950s (Rottenberg, 1956). The economic impact of events (Crompton, 1995), determinants of demand (Borland & MacDonald, 2003), incentives and team strategies (Fort & Quirk, 1995), outcome predictions (Boulier & Stekler, 1999), sports betting markets (Sauer, 1998), and psychological and behavioural issues (Gilovich, Vallone, & Tversky, 1985) are relevant topics in the field. Many of the contributions underline the similarities and peculiarities of sports with regard to other industries.

In sports, as in many other industries, the members of a team perform tasks to achieve specific goals and receive a salary for their work. Moreover, the groups have leaders, who are responsible for forming the team, defining individual roles, devising strategies, and communicating the final results. Many authors use the similar remit of coaches in sports and managers in other industries as an analogy to examine managerial issues (e.g., Ladyshevsky, 2010). Section 1.2 discusses the advantages of using sports data to understand the relationship between employers and employees.

Despite these similarities with other industries, professional sports leagues have unique characteristics that invite the attention of research. In the US, professional sports leagues have a “closed” status. This means that teams operate as monopolies in their market, and other teams cannot enter the competition without the permission of the league. Generally, the leagues only allow one team per city, with the exemption of big metropolises such as Chicago or New York.

In Europe, the professional sports system works differently. Sports leagues are “open” and teams access and exit the top competitions based on sporting merits. This is the promotion-relegation system. The location and fan base of teams do not limit the participation in the competition. Indeed, big cities in many countries have several teams competing in the top league, e.g., soccer in England and Spain.²

In this line, the main focus of multiple papers is to discuss the objective functions of sports teams. A traditional assumption is that teams in closed leagues maximize profits (Fort & Quirk, 1995) while teams in open leagues maximize wins (Dietl, Lang, & Nessler, 2017). However, recent contributions challenge this assumption and argue for weights on winning, profits, and fan attendance (Fort, 2015). This discussion on the objective functions of teams leads to the focal point of the literature on sports economics.

A sports team competes against other contestants for wins. However, unlike any other market, an overwhelming competitive advantage against rivals can actually harm the game, and hence the business. This sort of seesaw game, in which leagues need to balance the strength of teams for the good of the show, is known as competitive balance. The next subsection provides a more detailed definition of competitive balance and explains its influence on sports leagues’ policies. Moreover, the subsection cites several methodological approaches to analyze competitive balance, to which Chapter two aims to contribute.

1.1.1 Competitive balance in professional sports leagues

In sports economics, research measures the strength of teams in playing talent. This means that some teams have better players than others, so the chances of stronger teams to achieve wins are higher. Competitive balance is a concept that refers to the results of the teams in a sports league, and how close the competition is. Greater

²Do teams actually benefit from operating in locations close to each other? Perhaps, the principles of agglomeration economies that research observes in high-tech clusters such as Silicon Valley (Bresnahan, Gambardella, & Saxenian, 2001) also find support in the context of sports.

differences in playing talent among teams decreases competitive balance.

This issue is crucial for the sports business. Watching an event where one can easily anticipate the final outcome is not very attractive. Neale (1964) used the fights between two famous boxers in the 1930's, Joe Louis and Max Schmeling, to illustrate this point. Competitive advantage does not always help contestants to increase revenues in sports. Fans were excited about the fights because they did not know what was going to happen and the athletes' level promised a long-lasting fight. The author named this relationship the "Louis-Schmeling paradox".

Competitive balance is important for sports leagues because it is actually linked to demand; fans care about it. The traditional hypothesis is that uncertain sports events stimulate fans to watch games on television or buy tickets to go to the stadium. The literature refers to this hypothesis as the uncertainty of outcome hypothesis (UOH), which has been tested in numerous leagues using attendance figures and television ratings. However, empirical results do not always support UOH; see Pawlowski (2013) for a review in soccer.

The determinants of demand in sports are complex and uncertainty is not the only factor that plays a role (García & Rodríguez, 2009). For example, in Neale's (1964) context in the late 1930's, Joe Louis (USA) and Max Schmeling (Germany) were athletes that represented two opposite political poles that were about to crash in World War II. Therefore, beyond genuine interest of boxing fans in watching a good fight, they might also have had a preference for one boxer. This point illustrates the "local team effect" that many papers find when exploring the UOH. On the one hand, local fans want to see close games and competitions where all participants can win, but on the other hand, they also want their favourite team to win.

Therefore, "competitive balance is like wealth. Everyone agrees it is a good thing to have, but no one knows how much one needs" (Zimbalist, 2002, p. 111). This complexity justifies the great number of papers in sports economics that deal with this topic. The argument in favour of balance in competitions allowed professional leagues to implement several policies that constrain the capacity of teams to accumulate playing talent.

For example, teams that operate in big cities have a bigger fan base, which can provide larger revenues and unbalance the competition. To prevent smaller teams from being at a disadvantage, closed leagues such as major sports leagues in the US implement several economic regulations that aim to maintain competitive balance. These regulations limit the amount of money that teams can spend on players' wages

(salary cap), force teams to share gate ticket revenues (revenue sharing), and prevent big franchises to sign the best players (draft).

An important strand of literature focuses on changes in competitive balance over time and the effect of the above-mentioned economic regulations, which is primarily based on the major leagues in the US, e.g., rights of playing talent in Major League Baseball (Schmidt & Berri, 2003). However, other papers also examine competitive balance in European soccer after new regulations regarding foreign players (Flores, Forrest, & Tena, 2010) or changes in the point score systems (Haugen, 2008). The list of sports leagues that receive the attention of research on competitive balance is extensive, even in minor sports, e.g., road cycling (Rodríguez, Pérez, Puente, & Rodríguez, 2015) or racquet sports (Gomez-Gonzalez & del Corral, 2019).

The vast majority of papers use measures of competitive balance that provide numerical outcomes that, moreover, are retrospective in nature. This means that most papers use the final results of a competition to provide an ex-post picture of competitive balance (Goossens, 2006). Other research fields in economics use similar measures. For example, concentration ratios are often used to calculate the percentage of the market share that certain firms control in an industry (Rogers, 2004).

The most recurrent measures of competitive balance in sports are the standard deviation of wins, the Hirschman–Herfindahl Index, the Gini coefficient, the number of teams in top positions over time (top k ranking), and the concentration ratio of wins and points (Goossens, 2006). Chapter two provides more information and specific references to papers that use these measures.

The format and structure of professional sports leagues include multiple prizes, i.e., mini-competitions such as qualifying for international competitions or not being relegated, which are interesting for fans. To measure competitive balance, the literature uses ex-post measures and provides a numerical outcome. However, this type of outcome is not able to capture the complexity of the league regarding the multiple prizes, which provides a relevant opportunity for research.

Moreover, competitive balance is closely associated with teams' playing talent. However, the final outcome in sports do not always reflect the playing talent of teams due to external factors (noise of the competition): referee decisions, unexpected performance, or injuries of players. Therefore, recent studies decide to use prospective measures to analyze competitive balance (e.g., Bowman, Lambrinos, & Ashman, 2018; McEwen & Metz, 2016). In addition, the analysis of competitive

balance can benefit from measures that capture the multiple prizes of a competition. New sources of information related to the betting market offer the opportunity to develop this type of measures.

Chapter two presents a paper that uses information extracted from the betting market to create a graphical measure of competitive balance. The betting market is a useful source of information for economic analysis, as it provides odds that are ex-ante in nature. Following previous research, we convert the odds into teams' probabilities of win to compare the strength of teams and the uncertainty of games (Franck, Verbeek, & Nüesch, 2010). The chapter explains in detail the differences between prospective (ex-ante) and retrospective (ex-post) information, the complex payoff structures of soccer leagues, and the importance of graphical measures in competitive balance.

The paper uses data from the Major League Soccer (MLS) in the US from 2004 to 2015. First, the paper analyzes the evolution of competitive balance in this league, which is overlooked in the literature. Second, the paper presents a methodology to develop a graphical measure of competitive balance based on density function charts. Third, the paper uses two economic regulations, i.e., the designated player rule (DP rule) and the expansion of the league, to highlight the managerial implications of the graphical approach.

1.2 The economics of sports as a laboratory

Beyond the economic importance of sports, this setting has the potential to contribute to the understanding of issues with a broader impact. Kahn (2000) and Longley (2018) illustrate the opportunities that sports leagues provide to research in labor and personnel economics. No other setting supplies so much detailed information on the characteristics, background, relationships, and career history of the agents working in an industry.

Moreover, while most research in other industries needs to rely on data from census and surveys, contributions in sports economics are able to measure individual performance. A great number of studies use this advantage to analyze different issues in the labor market, e.g., wage inequality among employees and firm performance (Berri & Jewell, 2004), contract duration, wages, and mobility (Frick, 2007), or cultural diversity and performance (Maderer, Holtbrügge, & Schuster, 2014).

Among labor issues, the use of the sports setting is especially relevant for research that focuses on the discrimination of minority groups (Simmons & Berri, 2019). This is due to three main reasons. First, the access to detailed information on agents' performance and productivity is essential to uncover group preferences and discrimination. Becker (1957) argues that the competition of the market would eliminate discrimination as organizations that rely on preferences rather than productivity will not be able to survive. However, the lack of reliable measures of productivity in many industries might allow organizations to maintain a taste for discrimination.

Second, in sports, research can examine the actual performance of leaders, who play a crucial role in all organizations. Team leaders are very relevant as they have the ability to impact the performance of many coworkers, so their influence is multiplicative (Longley, 2018). This influence of leaders is more important in volatile situations as the potential outcome heavily depends on their ability to make decisions promptly (Lazear, 2012).

In many industries, CEOs take responsibility for the performance of companies. However, these companies include several departments with a large number of team members and negative outcomes are caused by multiple factors that go beyond the control of CEOs (Jenter & Kanaan, 2015). In sports, the number of team members is smaller and, therefore, the impact of the managerial decisions of head coaches is greater (Frick, 2018). Moreover, measures of team talent and expected outcomes are available. Thus, labor decisions that involve leaders and do not match performance outcomes might have embedded other types of personal preferences.

Third, sports competitions overcome the issue of the underrepresentation of minority groups in influential positions (Acosta & Carpenter, 2014). While white males dominate leadership roles in the vast majority of organizations, head coaching positions in sports teams are usually more diverse regarding gender and race. This characteristic of sports teams is an opportunity to empirically compare the performance of leaders in a competitive labor context. This dissertation puts the focus on leaders' gender and race, which are two attributes that generate conflict in the workplace.

1.2.1 Gender issues and stereotypes in the workplace

Gender equality is a major point of discussion for most democratic countries. In Europe, for example, several institutions and organizations such as national gender equality bodies, advisory committees, and specialized institutes work towards equality. Specifically, the European Commission puts the focus on the gender gap and the underrepresentation of women in decision-making positions (European Commission, 2019b).

The limited number of women in certain fields and managerial positions explains part of the gender pay gap (Blau & Kahn, 2017). STEM (science, technology, engineering, and mathematics) fields are examples of male-dominated workplaces. Several theories explain the underrepresentation of women. Some argue that nature determines cognitive ability, e.g., mental rotation (Voyer, Voyer, & Bryden, 1995), and hence the representation of men and women in certain occupations. However, research does not fully support this assumption: evidence across countries is contradictory and the social context can alter the outcome (Ceci & Williams, 2007; Lorenz, 2018).

Personality traits and risk, as well as competitive, preferences of men and women are also used to explain the underrepresentation of women in leadership positions in the labor market (Croson & Gneezy, 2009). However, many of the measures that attempt to capture differences in personality traits, e.g., empathy, are self-reported, which are usually not reliable to predict actual interpersonal accuracy (Davis & Kraus, 1997). Moreover, it is not clear that some traits are necessarily better than others when managing an organization or leading a team (Eagly & Carli, 2007).

In this line, a prominent and recurrent stereotype that women face in male-dominated fields is: “women can’t do it”. This stereotype of competence is strongly embedded in fields such as STEM or sports and generates barriers for women to perform. The literature refers to this relationship as the “stereotype threat” (Spencer, Steele, & Quinn, 1999). Women in male-dominated fields know that any mistake can be attributed to their gender, regardless of any other factor, and reinforce the stereotype. The high pressure associated to this threat and the small number of role models make male-dominated fields hostile workplaces for women, who might opt for failure-prevention strategies of task solutions (Seibt & Förster, 2004) or even different occupations (Cheryan, Plaut, Davies, & Steele, 2009).

The access to networks is another potential cause of the underrepresentation. Gender and race features of networks also have an influence on the access of minority

groups to social capital resources (McDonald, 2011). The “old boys’ network” refer to the dominant position of white males in organizations. Thus, men benefit from preferential access to influential positions and tend to choose others who are similar to enter the network. This idea is in line with the similarity/attraction paradigm (Byrne, 1971) and generates barriers that prevent women from reaching leadership positions in male-dominated organizations (glass ceiling -Morrison, White, & Van Velsor, 1987).

Multidisciplinary research discusses that early-inherited social roles and stereotypes determine the position of women in the labor market as well (Fine, 2010). For example, traditional social roles impose the housework on women. Experimental studies recurrently show that it is significantly harder for women to access job positions than it is for men in non-feminine fields, e.g., in academic science (Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012; Steinpreis, Anders, & Ritzke, 1999) and even more if women are mothers (motherhood penalty -Correll, Benard, & Paik, 2007). In addition, the literature shows that women constantly report more required work effort (vagina tax -Gorman & Kmec, 2007) and reports the existence of a pay gap, whose unexplained part does not disappear after controlling for all possible factors (Blau & Kahn, 2017).

Sports is an example of a male-dominated field, especially regarding leadership positions. Historically, women were excluded or strongly discouraged from competitive sports participation. However, recent actions have improved the role of women within the sports industry. For example, Title IX, which is a major federal law implemented in the US in 1972, banned sex discrimination (among other kinds of discrimination) at all levels of the educational system, including sports competitions. However, while the law increased the participation levels of women athletes, it failed to equalize the number of men and women in leadership positions (Walker & Bopp, 2011). While men can access coaching positions in both men’s and women’s sports labor markets, women mostly coach women’s teams, in which they are also outnumbered.

This disadvantage has attracted the attention of the literature on sports management and economics. Darwin, Pegoraro, and Berri (2018) find in the literature three potential reasons for the underrepresentation of women in coaching positions in sports: lower supply (lack of interest or family roles), discrimination at different levels (role within the field), and lower productivity that drives women out of the market.

Among these potential reasons, the hypothesis of performance differences between men and women is of special interest for gender economics due to two main reasons. First, measures of team performance in sports are always available, e.g., points, and capture the managerial influence of leaders, which is a major challenge for the literature dealing with gender differences in leadership positions (Kulik & Metz, 2015). Second, sports data provide detailed information on the experience and quality of the team members. This type of information adds an important control and improves a drawback of the literature that examines female participation in leadership positions and performance in other industries.

Chapter three aims to examine differences in performance between men and women leaders in a male-dominated field. The empirical results can shed light on the notion that women cannot perform certain jobs in specific labor settings. The analysis uses data from three major women's soccer leagues in Europe (France, Germany, and Norway) and compares the performance of teams coached by men and women. The analysis includes the period 2004-2017. In these leagues, the percentage of women coaches, which has decreased in the last ten years, is between 20% and 30%. One possible explanation of this gap is that men and women coaches perform differently.

The only precedent to this analysis is the study of Darvin et al. (2018), which examines the productivity of women's teams in the Women's National Basketball Association (WNBA) and the National Collegiate Athletic Association (NCAA) in the US. The authors examine the role of the gender of the coach on the productivity of teams and do not find significant results. Chapter three uses a measure of team performance (points per game) and analyze a different sport (soccer) in a different context (European countries). The analysis uses regression models, which include variables on coaches, team, and players characteristics, to determine the influence of the gender of the coach on team performance.

The chapter relays on group diversity theories, which involve the preferences of team members as a moderator of performance, to derive the hypotheses in the theoretical framework. Women coaches need to face the stereotypes that are embedded in the sports workplace, but might also benefit for the preferences of women players. Thus, women coaches might even report better results than men coaches in these specific leagues.

1.2.2 Racial biases in the workplace

Eradicating racial discrimination is also a priority for a great number of countries. To understand this issue, it is necessary to comprehend the concept of race and its evolution. Providing a correct definition of race is both challenging and adventurous. While scientists argue that racial categories are no longer accurate proxies for genetic diversity, they are still useful for research as a social construct (Gannon, 2016).

From a simplistic biological perspective, “race” refers to the innate physical characteristics, e.g., skin color, that groups of people share. Societies and cultures identify these characteristics and often associate them with a shared culture (language, practices, and values) and stereotypes. This social meaning of race has historically served civilizations to create groups of the “us-them” nature, which determined social relations, attitudes, and positions (Park, 1950).

Racial discrimination is nowadays prohibited by law in the majority of democratic countries. However, the residuals of historical discrimination against some racial groups might still determine their role in our societies. The history of the US and the evolution of racial discrimination against the black population is a thrilling topic. However, this dissertation focuses on the negative influence that inherited racial biases have on the integration of the black population in the US society today.

Prior to the Civil Right Acts in the 1960s, racial discrimination was obvious in the US. After the abolition of slavery, black citizens were legally segregated and separated from white citizens in transportation, public facilities, or schools, which was especially pronounced in southern states (“Jim Crow laws”). With regard to employment opportunities, research documents discriminatory practices against black Americans in the labor market during that period as well (Wilson, 1980). Therefore, until the 1960’s, blacks with adequate qualifications and skills were systematically denied access to positions of influence in firms and organizations. These events generated a social meaning of race and stereotypes, which are likely to remain, at least partially, in the contemporary North American society.

Two seminal papers published in the late 1990s are indispensable to understand the contribution of economics to the issue of racial discrimination (Arrow, 1998; Darity & Mason, 1998). These authors make an important distinction between taste-based and statistical discrimination, and discuss the mechanisms by which discriminatory practices still persists in competitive markets today.

Becker (1957) introduces the first model for discrimination, in which employers have a “taste for discrimination” that employees from minority groups have to compensate with either more productivity or lower wages. In this model, the taste for discrimination will disappear due to the competitive requirements of markets and may result in segregated occupations: white businesses hiring only white employees and black businesses hiring only black employees. However, the markets were not able to eradicate racial inequality and discrimination, even after civil right legislation. Several papers provide evidence of labor market discrimination in the US (e.g., Bertrand & Mullainathan, 2004; Pager, Bonikowski, & Western, 2009).

Arrow (1998) and Darity and Mason (1998) discuss a number of microeconomic theories that explain the persistence of discrimination in the labor market. For example, both papers discuss that discrimination can come not only from the side of the employer, but also from other workers and customers. Darity and Mason (1998, p. 82) refer to this issue as the customer discrimination story: “businesses discriminate not because they themselves are bigoted but because their clients are bigoted”. Moreover, Arrow (1998) anticipates that the complementary labor inputs (managerial vs. floor work positions) complicate the taste for discrimination and increase disparity. However, both works identify statistical discrimination as one of the most plausible explanations.

Darity and Mason (1998) consider statistical discrimination as a matter of imperfect information and beliefs. In most industries, employers cannot obtain all the information that they would like to have about the potential employees or the actual performance of current employees. In this scenario, employers have an incentive to seize group membership (and choose similar others) as a predictor of candidate’s ability to perform (Darity & Mason, 1998). Similarly, Arrow (1998) argues that hypothetical differences in performance by race might be due to unobservable human capital factors, e.g., quality of education or previous experience, but employers will identify the observable factor, i.e., race, as the cause.

Finally, both papers link the issue of statistical discrimination with barriers to access the network, especially in hierarchical occupational structures. Individual choices and preferences have an influence on social interactions and economic decisions in the labor market, beyond depersonalized market characteristics. Arrow (1998) refers to the social structure of the network of acquaintance and friends to explain how network referrals can convert social segregation into labor market segregation.³ This link is specially harmful for black Americans, who historically had

³This idea has been developed and tested in multiple empirical papers since Granovetter (1973).

a restricted entrance to influential networks in the US, as race can serve as a gate-keeping mechanism that controls access (and promotion) to managerial positions (Darity & Mason, 1998).

Arrow (1998) explicitly points out that to distinguish between taste-based and statistical discrimination in the labor market research would need to find individual measures of performance and productivity, which do not exist in many industries. In such a dilemma, these introductory lines aim to emphasize what sports economics has to say about discrimination. Sports, as this section has already noted, is an appropriate field to examine economic issues in the labor market (Kahn, 2000). This field is especially informative for the analysis of racial discrimination due to three main reasons.

First, unlike other industries, black Americans have managed to reach leadership positions in sports as head coaches. This minority is, thus, visible in the media and responsible for the performance of an influential group of athletes. Second, the representation of black Americans in sports leagues is asymmetric. This means that while the majority of players in certain sports, e.g., basketball, are black Americans, the majority of coaches are white Americans (Lapchick & Balasundaram, 2017). This is a surprising fact as previous playing experience is often considered an asset to coach a team.⁴ And, third, research can gather extensive information on the characteristics of coaches, quality of players, and performance of teams.

Among different sports, basketball is one of the most representatives for black Americans. Moreover, due to the characteristics of the game, research has access to detailed statistics of teams at a game-day level. Therefore, many economists use this league to empirically analyze preferences and discriminatory practices against minority groups. For example, studies analyze fan preferences in the National Basketball Association (NBA) in the US, and find that a larger share of white players on a team was correlated with higher Nielsen TV ratings (Kanazawa & Funk, 2001) and a larger white population in a metropolitan area (Burdekin, Hossfeld, & Smith, 2005). These fan preferences could explain the significant higher salary (18%) at the upper end of the distribution (star status) that white NBA players enjoyed (Hamilton, 1997).

Other works examine the influence of the so called own-race bias on the decisions of agents. For example, Price and Wolfers (2010) find that referees call more fouls per minute on players of different races in the NBA. These results are relevant as

⁴The evolution of the number of African Americans head coaches in college basketball is especially informative (Nessler, Gomez-Gonzalez, Dietl, & del Corral, 2018).

they denote an implicit association bias, which is often discussed in the literature⁵ and might be more recurrent in split-second decisions taken under pressure.

Finally, a great number of contributions use the sports setting to analyze in-market discrimination against black American coaches, which according to Darity and Mason (1998) only occurs when all other attempts to impede the access to the market fail. This is plausible in professional sports, where the competition is fierce and the pool of qualified coaches with experience to guide a team is limited.

A recurrent analysis in this literature focuses on the influence of race on dismissal decisions. This is due to the high number of dismissals of coaches in sports teams and the availability of detailed measures of team performance. However, the evidence of this relationship is ambiguous. Chapter four creates a measure of coaching effectiveness based on information from the betting market to examine the relationship between the race of the coach and dismissals in the NBA.

The measures of performance and productivity in sports grow larger by the day. One of the most complete measures of expected outcome, which is essential to evaluate the achievements of coaches, are betting odds. Research in sports economics agrees that game outcome probabilities from betting odds are an accurate measure of team expected performance.⁶ Chapter four uses these probabilities to explore the relationship between coaching effectiveness and dismissals, isolating the influence of race in NBA. This chapter extends two previous contributions that use player's statistics (Fort, Lee, & Berri, 2008) and teams' winning percentage (Kahn, 2006) to calculate the efficiency of coaches and uncover racial biases.

The chapter also extends the period of time covered by previous research. The database includes a 24-year period in the NBA, which starts with the 1993-1994 season. The paper uses several probit regression models that include information on the characteristics of coaches (age, race, experience, and career milestones) and the performance of teams (actual and expected) to examine the influence of race on dismissals.

Previous research does not find race to be a significant determinant of dismissal in NBA. This is the expected result in a competitive setting, where racial preferences

⁵See, for example, Rachlinski, Johnson, Wistrich, and Guthrie (2009) for judges' decisions in trial courts.

⁶The sports betting market reports a growing number of companies, which compete to assess teams' probabilities of win and provide competitive odds (Gomez-Gonzalez & del Corral, 2018). This competence among bookmakers and the nature of the relationship bookmaker-bettor, in which both seek profit, make the market efficient. Several papers demonstrate the possibility to extract accurate probabilities of outcome from the odds (e.g., Wolfers & Zitzewitz, 2006).

and the taste for discrimination should not influence labor decisions (Szymanski, 2000). However, the use of a more extensive database and a different measure of coaching effectiveness, which is related to fan expectations, yield novel results.

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Chapter 2

Prospective analysis of competitive balance

This study introduces a graphical methodology to the analysis of competitive balance in sports, which is prospective in nature and captures more subtleties than commonly-used retrospective measures. Thus, this study examines the evolution of competitive balance in Major League Soccer from 2004 to 2015, including the potential role played by certain league policies. For this purpose, we use prospective measures, based on probabilities that are extracted from betting odds (ex-ante), and retrospective indicators (ex-post). The results differ slightly when analyzing competitive balance and predicting attendance. However, the graphical measures provide additional practical information about the characteristics of competitive balance.

2.1 Introduction

Since the studies of Rottenberg (1956) and Neale (1964), the issue of competitive balance has been a focus of research interest in sports economics. The term “competitive balance” refers to the degree of parity among teams in sports leagues. From an economic perspective, competitive balance is an important factor since sports fans are often highly invested in the performance of their favorite teams (Zimbalist, 2006). The majority of empirical studies employ retrospective (ex-post) measures to test competitive balance. These papers normally use actual game outcomes such as victories or points as the basis of analysis. In contrast, recent studies argue for the use of prospective measures (ex-ante) based on expected rather than actual outcomes—in analyzing competitive balance (Bowman, Ashman, & Lambrinos, 2013a; Bowman, Lambrinos, & Ashman, 2013b; McEwen & Metz, 2016; Paul, Weinbach, Borghesi, & Wilson, 2009).

Kringstad and Gerrard (2007) explain that professional sports leagues have complex payoff structures that offer multiple prizes and mini-competitions, such as winning the league, qualifying for play-offs, or not being relegated. In the context of competitive balance, traditional measures that simply compare the accumulation of victories or points do not fully capture this complexity of payoffs and resulting outcomes.

As a simple example, consider a four-team league in which teams play each other twice. Each season, there are 12 games; in a sport with no ties, teams will share 12 wins. Assume that at the end of season 1, the four teams have 6, 2, 2, and 2 wins respectively, and at the end of season 2, the teams have 4, 4, 4, and 0 wins. One could argue that season 2 was more “competitive” since three teams tied for the top spot. However, the standard deviation of wins, which is a commonly-used measure of competitive balance (Fort, 2006), is equal to 2 in both seasons. Thus, analysis using the standard deviation of wins in this case leads one to conclude that there is no change in competitive balance from seasons 1 to 2.¹

The complex nature of sporting contests and leagues suggests the need for competitive balance analysis that captures the range of potential outcomes. In the present paper, we introduce a methodology for using ex-ante information from bet-

¹The insight that descriptive statistics are not necessarily indicative of the whole sample is hardly new. For instance, Anscombe (1973) illustrates this issue with the use of four datasets that have the same descriptive statistics but appear very different when they are plotted. The author described the article as an effort to contradict the belief that numerical outcomes are more informative than graphs.

ting markets to consider the entire distribution of expected performance. The graphical results allow for a more complete picture of competitive balance across all teams in a given league and how this balance changes over time. We also add to the literature by analyzing a relatively young, North American professional league: Major League Soccer (MLS). MLS provides an excellent case due to its distinctive league structure and policies. For our analysis, the probabilities of winning are calculated from MLS betting odds during the period 2004 through 2015.

The aim of this study is to examine the characteristics of competitive balance in MLS by using sports betting data in conjunction with graphical analysis. The main contribution of the study is, then, a graphical interpretation of competitive balance, which identifies the subtleties of competitive balance and incorporates expected team performance. Overall, the graphical interpretation of ex-ante information provides meaningful information for league managers while expanding on previous analyses solely based on numerical outcomes in soccer leagues.

2.2 Literature review and contextual setting

According to Fort and Maxcy (2003), the literature on competitive balance in sports leagues can be separated into two distinct strands: (1) The analysis of changes in competitive balance over time in a given league and the effect of league policy on those changes; and (2) tests of the effect of competitive balance on fan behavior: either on a per game or per season basis. With respect to analysis of the first type, a wide variety of indicators have been used to measure competitive balance over time, including season-levels indicators such as the standard deviation of winning percentages (Fort 2006; Larsen, Fenn, & Spenner, 2006; Owen, Ryan, & Weatherston, 2007), the Hirschman–Herfindahl Index (Depken, 1999; Humphreys, 2002; Totty & Owens, 2011; Zimbalist, 2002), the Gini coefficient (Schmidt, 2001), and concentration ratios (García & Rodríguez, 2007).

These above-mentioned indicators of competitive balance over time are based on ex-post outcomes, which give an indication of competitive balance at the end of a competition. Studies that test the relationship between fan behavior and competitive balance (the second type of analysis that was mentioned previously) normally use ex-ante measures: measures that are available before the competition and that are indicative of the expectations of fans or prediction experts. In many cases, the analyses are conducted using data from the sports betting market (Bloching

& Pawlowski, 2013; Buraimo & Simmons, 2008; Forrest, Beaumont, Goddard, & Simmons, 2005; Knowles, Sherony, & Hauptert, 1992; Pawlowski & Anders, 2012; Peel & Thomas, 1988, 1992).²

Using betting market information to analyze competitive balance over time (analysis type one above) is an approach that has only recently been introduced in the sports economics literature. Paul et al. (2009) use betting market odds to test how competitive balance changed from 1996 through 2006 in the US Major League Baseball (MLB). The authors find that, on average, the win probability (extracted from pre-game betting odds) for the favored team in each game—ex-ante factors—increased in the 1990s, while winning percentages and Gini-coefficients—ex-post factors—remained stable. This result suggests that prospective and retrospective measures provide different information, which further suggests the need for an analysis of these differences.

More recently, McEwen and Metz (2016) calculate the standard deviation of the ex-ante probability of winning a championship at start of season to analyze the competitive balance of several North American major leagues. Bowman et al. (2013b) use point spreads to create long-term competitive balance measures in which they analyze the US National Football League (NFL) and the US National Basketball Association (NBA) over a two-decade period. Similarly, Bowman et al. (2013a) use money lines to examine competitive balance in MLB from 1999 to 2011.

A major advantage of using ex-ante information, such as betting odds, in competitive balance analyses is that pre-match information simultaneously incorporates the skill levels of the competing teams and fan expectations. Bowman et al. (2013a) explain that betting odds provide impartial information with regard to expected outcomes and these odds incorporate fans' perceptions about the potential of teams, especially with regard to the distribution of talent among teams and players.

Peel and Thomas (1988, 1992) and Buraimo and Simmons (2008) also explain that betting odds incorporate information with regard to factors that can influence the expected outcome, such as how well the team has performed in recent matches. Oikonomidis and Johnson (2011) show that betting odds can be used to predict

²We note the difference between expected competitive balance and perceived competitive balance. The former refers to fans' predictions about the final outcome of a game (based on teams' potential), which indicates that uncertainty of an outcome and competitive balance levels. In contrast, the latter refers to how much fans care about competitive balance (and the effect that this has on the demand). The literature on perceived competitive balance (PCB) mainly uses survey data. Please see Nalbantis, Pawlowski, and Coates (2017) and Pawlowski (2013) as examples of this line of research.

match outcomes, with a success rate that is comparable to sophisticated econometric models. Furthermore, ex-ante forecasts that use betting odds are helpful in alleviating the “noise” of the competition itself, such as poor referee decisions.

According to Štrumbelj and Šikonja (2010, p. 482), bookmaking odds can “be viewed as probabilistic assessments of a sporting event’s outcome, or, in other words, as forecasts.” Although some studies have identified biases in betting odds (Flepp, Nüesch, & Franck, 2016; Levitt 2004), many authors confirm that betting odds are an unbiased estimator of accurate probabilities of outcome (Buraimo & Simmons, 2008; Forrest & Simmons, 2008; Pawlowski & Anders, 2012; Sauer, 1998). Bowman et al. (2013a) suggest that the potential inefficiencies of the betting market are eliminated over time as bettors identify opportunities for profit. Similarly, Buraimo, Forrest, and Simmons (2007) argue that the need to prevent bettors from obtaining large benefits forces bookmakers to set accurate odds.

Most of competitive balance studies analyze the main North American major leagues or the top European soccer leagues. In contrast, MLS is not as intensively studied, perhaps due to the league’s relatively short history or the slow acceptance of soccer in North American culture (Markovits & Hellerman, 2001). However, MLS has several characteristics that make it distinctive as compared to major North American and European leagues; in addition, some of its peculiar characteristics are expected to influence competitive balance. For example, MLS has a unique single entity structure that allows the league to exert more control over the distribution of talent among teams (Jewell & Molina, 2005). Theoretically, the single-entity structure should lead to more competitive balance vis-à-vis other professional soccer leagues; this is a hypothesis that is supported with the use of standard ex-post measures (Jewell, 2015).

MLS has also incorporated other rules and regulations that are designed to increase competitive balance, such as: salary caps; inverse-order drafts; and revenue sharing (Strutner, Parrish, & Nauright, 2014). The effect that these rules have on other professional sports leagues has been exhaustively studied in the literature (Larsen et al., 2006; Lee, 2010; Maxcy & Mondello, 2006; Totty & Owens, 2011; Vrooman, 2009). Although league policies such as those that are used in MLS are not always effective in increasing competitive balance because of the interactions with other rules and team differences, they generally succeed in controlling the distribution of talent among teams (Berri & Simmons, 2011; Dietl, Grossmann, & Lang, 2011; Totty & Owens, 2011).

Finally, MLS has recently adopted new expansion strategies to enhance the popularity of the league; these strategies include the construction of soccer-specific stadiums (Strutner et al., 2014) and the hiring of elite (and mostly foreign) players under the Designated Player (DP) rule that was instituted in the 2007 season (Jewell, 2017). The DP rule is of particular interest in the present study, because the rule can lead to decreased competitive balance by allowing teams to hire elite-quality players at wages above the salary cap. Coates, Frick, and Jewell (2016) show that DPs are concentrated among only a few MLS clubs: those with the largest fan bases and the most flexibility to spend over the cap. If these DPs perform at an elite level on the field, then one would expect a concentration of talent in the clubs that can hire them, which would lead to less competitive balance over time.

2.3 Data and methodology

In this section, we describe the methodology used to analyze competitive balance in Major League Soccer from 2004 to 2015. Over this period, there were substantive changes in MLS. Along with the policies and rule changes discussed in the previous section, MLS underwent a period of expansion: It doubled in size—from 10 clubs in 2004 to 20 in 2015. Furthermore, MLS game-day attendance increased by over 39% on average from 2004 to 2015: Per-game attendance rose from 15,506 to 21,546. Thus, the story of MLS over this 12-year period is one of growth and change, which presents an interesting opportunity to analyze competitive balance in a professional sports league in transition.

The measures of MLS competitive balance discussed below are novel in that they attempt to capture the distribution of ex-ante competitive balance rather than the ex-post competitive balance measures that are used in the majority of existing literature. We begin the analysis by creating a graphical analysis of MLS expected performance using prospective measures. To complement the graphical analysis and to simplify inter-season comparisons, we next compute the standard deviation of expected performance by season. Next, we use well-established retrospective measures of competitive balance (the standard deviation of actual points) to compare ex-post competitive balance to ex-ante competitive balance. Finally, to study further the differences between ex-ante, i.e., expected points from betting odds, and ex-post, i.e., actual final standing points, data, we provide a correlation analysis and a regression model with attendance figures as the dependent variable.

As our primary measure of competitive balance, we employ the betting odds that have been extracted from the Oddsportal website (www.oddsportal.com) to calculate the probabilities of winning and to build the distribution of ex-ante expected wins. The probabilities of winning that are extracted from the betting odds have been used to investigate competitive balance and demand issues in recent soccer-based studies (Bloching & Pawlowski, 2013; Buraimo & Simmons, 2008; Franck, Verbeek, & Nüesch, 2010; Pawlowski & Anders, 2012). These odds are the average of the closing odds (the last odds offered by bookmakers just before the kick-off) from several betting companies and represent the combined knowledge of bookies and bettors about the competing teams prior to each match.

Although betting odds should correlate with outcomes to some extent, the use of these probabilities is informative for competitive balance analysis because they provide information regarding the outcome without including the random noise of the competition itself. For use in comparing prospective to retrospective measures, game outcome data and attendance figures are obtained from the official MLS website (www.mlssoccer.com).

The two prospective measures that we developed require that betting odds are converted to the probabilities of the three possible outcomes in a soccer game: a home win, a draw, or an away win. Oddsportal betting odds are listed as decimal odds (o_e), which represent the payout ratio of a winning bet. The inverse of these odds can be interpreted as the probability of the events happening. To include bookmaker profit, odds are set so that the sum of the inverse of the odds is greater than one, known as the over-round. To obtain the implicit probabilities from betting odds, this paper follows Franck et al. (2010) by assuming that the over-round is equally distributed over all three outcomes. Thus, the probability of event e occurring (P_e) is computed as listed in Equation (2.1), where the inverse of the odds of event e is divided by the over-round, and the odds of a home win, an away win, and a draw will sum to one.³

$$P_e = \frac{1}{o_e} \frac{1}{\sum_e \frac{1}{o_e}} \quad (2.1)$$

The density function charts are created with the well-established 3–1–0 scoring system used in MLS and most other soccer leagues. This system awards 3 points

³As an example, consider a match with closing odds listed as: home win (1.70); draw (3.25); and away win (4.12). The over-round is 14%, which results in the implicit probabilities of: home win = 0.52; draw = 0.27; and away win = 0.21.

to the team winning the game, 1 point to both teams if there is a draw, and 0 points to the losing team. This measure requires calculating the probabilities of the teams achieving all of the possible combination of points in a season. In a season of k games, the range of potential points runs from zero (the club loses all its games) to $k \times 3$ (the club wins all its games). Within the range of potential points, the probability that a club earns any given level of points is simply the sum of the probabilities of all the combinations of game-level outcomes that lead to that number of points. Equation (2.2) gives the probability of a club i earning j points in k games (P_{ijk}), computed as the sum of all m combinations of k games that generate j points given the betting odds of club i , where p_{ijm} indicates the odds associated with club i earning j points at combination m .

$$P_{ijk} = P_i(\text{points} = j | k \text{ games}) = \sum_m \rho_{ijm} \quad (2.2)$$

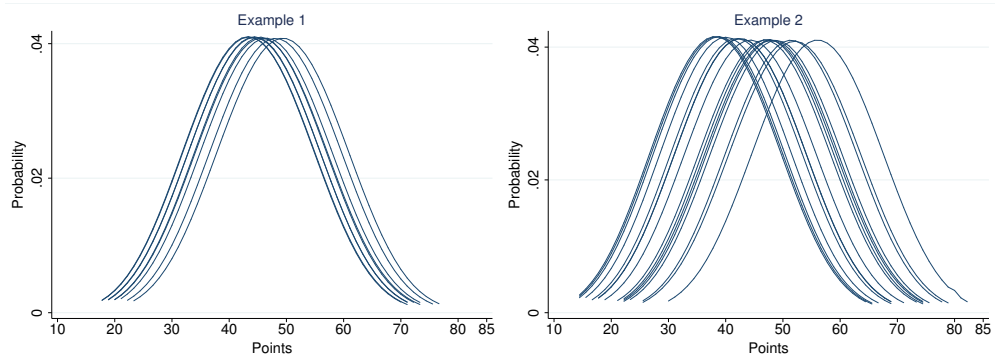
As an example, consider the first two games ($k = 2$) for Los Angeles Galaxy in 2004. The final odds (ρ_i) for a home win, draw, and away win were the following: game one, 0.52, 0.27, and 0.21; and game two, 0.47, 0.27, 0.26. The range of potential points for these two games is zero to six. There is one combination of two game-level outcomes ($m = 1$) that leads LA Galaxy to have six points ($j = 6$): win game one and win game two. The probability of winning both games is simply the product of the probability of winning both games one and two ($\rho_{i,6,2} = 0.52 \times 0.47 = 0.24$). Likewise, LA Galaxy would earn zero points ($j = 0$) in one case ($m = 1$), if they lose both games one and two ($\rho_{i,0,2} = 0.21 \times 0.26 = 0.05$).

LA Galaxy could earn one point ($j = 1$) if they tied either game 1 or 2, while losing the other. The sum of the probabilities of these two outcomes ($m = 2$) is the probability that LA Galaxy has one point after two games ($\rho_{i,1,2} = [0.27 \times 0.26] + [0.21 \times 0.27] = 0.13$). Similarly, the probability of reaching two, three, or four points will be the sum of the probabilities for potential outcomes that add to that number of points: 0.07, 0.24, and 0.27, respectively. To extend the example for LA Galaxy to an entire season, one would calculate the probabilities of each potential-points outcome, ranging from zero to $3 \times k$ points. Although the number of calculations increases exponentially with k , the basic probability calculations use multiplication and addition.⁴

⁴The number of games varies somewhat in MLS over the analyzed period. In order to analyze competitive balance over time, we adjust for the total number of possible points in a season. The maximum number of points achievable by teams is standardized to 100 to facilitate inter-season comparisons.

When graphed and compared to other MLS clubs, these density functions visually represent the level of competitive balance in the league as a whole, and they also convey information that numerical expressions of competitive balance may not. In the scenario of a highly competitive league, one would expect the density functions for teams to be tightly distributed, as teams would have very similar expectations for points earned over a season (Figure 2.1: example 1). For leagues with competitive imbalance, density functions for better-quality teams will diverge—graphically move to the right, which signifies higher probabilities of achieving more points—from lower-quality teams, and vice versa (Figure 2.1: example 2).

Figure 2.1: Balanced (example 1) vs. imbalanced (example 2) competitions



The second prospective measure of competitive balance is based on the predicted number of points for a team in a season. We calculate predicted points as the expected value of the potential-points distribution, given probabilities and potential points from Equation (2.2). Specifically, where i , j , and k are defined as in Equation (2.2),

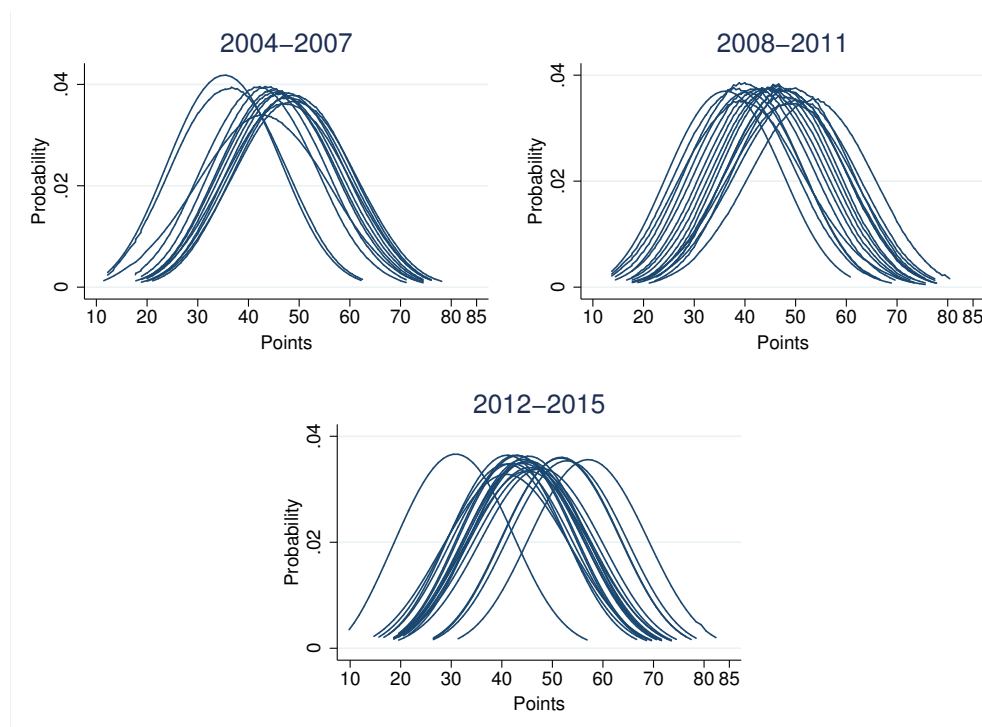
$$E(points_{ik}) = \sum_{j=0}^{3 \times k} P_{ijk} \times j \quad (2.3)$$

By calculating the standard deviation of Equation (2.3) for all MLS clubs in each season, we compute a single number that can be used to compare competitive balance across seasons. Finally, this single-number ex-ante measure can be compared to standard ex-post measures that are derived from teams' actual points at the end of each season.

2.4 Results and discussion

In this section, we show the evolution of MLS competitive balance during the period 2004 to 2015. As a starting point, we combine seasons into 4-year periods. In order to illustrate visually the impact of the Designated Player rule on league-wide competitive balance, the density functions of teams are combined for the years: 2004 to 2007 (pre-DP rule); 2008 to 2011 (immediately post-DP rule); and 2012 to 2015 (most recent seasons). Figure 2.2 maps the probability density functions for potential points for each team during the regular seasons comprising the relevant period.⁵ Each curved line segment represents one team's average potential-point distribution over the relevant time period.

Figure 2.2: Density functions of teams' expected points (4-year period)



Note: The graph scale shows the range 10–85 of the standardized points 0–100.

Figure 2.2 charts a solid level of competitive balance in the pre-DP rule era. In this period, the peak of the density function is between 40 and 50 points for most teams. The only outliers are Chivas USA and Real Salt Lake, which both have peaks at about 35 points. These two clubs were expansion teams that started play in the 2005 season, so their status as low outliers in this period is understandable. In a

⁵Like most other North American professional sports leagues, MLS runs a post-season tournament to determine the yearly champion. Post-season games are not included in our analysis.

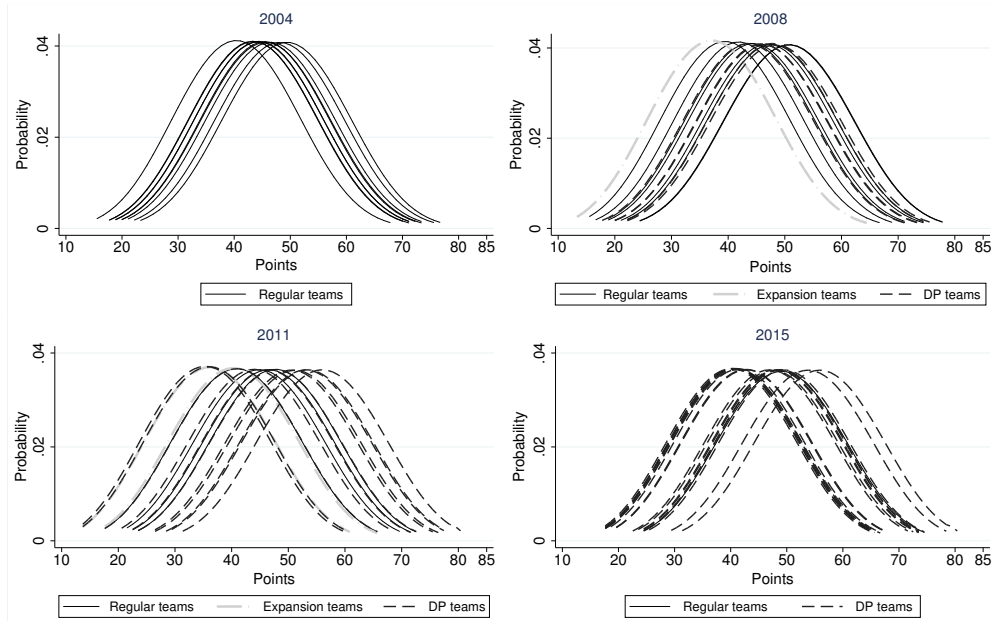
European-style soccer league that has relegation for the worst teams at the end of a season, Chivas and Real Salt Lake would likely have been sent to a lower division at some point in the time period. Interestingly, Chivas ceased operations after the 2014 season. On the other hand, Real Salt Lake has developed into a highly competitive club; in 2009, the team won the MLS postseason championship.

In the next 4-year period (2008–2011), which corresponds to the years after the implementation of the DP rule, we observe that the probability density functions begin to spread out when compared to the previous period. The peaks of these functions range from approximately 35 to 55 points. Note that compared to the pre-DP rule period, density functions are more evenly distributed over the range and that a few teams are beginning to separate themselves from the pack. During this period, MLS expanded by adding four new teams. Although one cannot directly attribute the spreading out of density functions to the DP rule given other changes that occurred, it appears that this period saw a decrease in competitive balance in MLS.

In the final period (2012–2015), the majority of team’s density functions are grouped in a manner similar to the pre-DP period, with the peaks centered on approximately 40 to 50 points. However, in the 2012 to 2015 period, three teams are clearly pulling away from the group, New York Red Bulls, Los Angeles Galaxy, and Sporting Kansas City. Thus, it appears that MLS competition became less balanced over time, when comparing the initial period to the late period. Note that two of the teams that appear to pull away in the latest period (New York and Los Angeles) had high-priced Designated Players in this period (Coates et al., 2016; Jewell, 2017).

Rather than examining longer time periods, density functions can be generated for each year. To simplify the analysis, we present only a subset of the sample, although density functions for all seasons are available from the authors. Figure 2.3 maps several individual years that are embedded in the previous figure. The four charts that form Figure 2.3 show the progressive evolution of MLS towards a more unbalanced competition, as was seen in Figure 2.2. A comparison of density functions 2004 and 2015 illustrates an intriguing change in MLS competitive balance: In 2004, the density functions for all teams are clustered quite tightly into a single group, while the league is clustered into three separate groups in 2015.

Figure 2.3: Density functions of teams' expected points



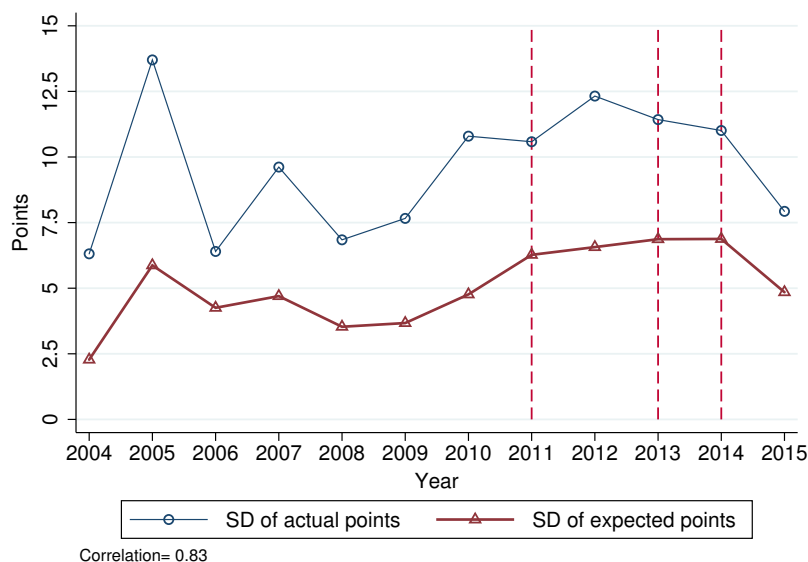
Note: The graph scale shows the range 10–85 of the standardized points 0–100.

The charts for 2008 and 2011 show the general trend toward a wider distribution of potential-point density functions, but this trend to higher variance among teams appears to coalesce into clearly delineated team-groups by the end of the sample period. Note that the “grouping effect” for 2015 would not show up in a single-number measure of competitive balance; it appears only when the probability density function of potential point outcomes is visually represented. The graphical analysis fills a gap in the literature that was identified by Kringstad and Gerrard (2007), who argued that alternative measures of competitive balance need to address the issue of mini-competitions in soccer leagues.

The identification of grouping of MLS teams in 2015 suggests that changes in competitive balance are subtler than simply an increase in the variance of outcomes. Consider MLS teams in 2004, most of which had a reasonable chance to win the league based on betting odds. However, for MLS clubs in 2015, teams in the top group could expect to compete for the championship, while teams in the bottom group would need to considerably outperform expectations to win the championship. And, if MLS ever does implement a system of relegation, the teams in the bottom group will battle to stay in the league. The grouping of MLS teams in 2015 indicates that different teams (and their fans) should have markedly different expectations for on-field performance and that league managers should adopt different strategies based on these disparate expectations (O’Reilly, Nadeau, & Kaplan, 2011).

Next, we compare information from our prospective measure to a commonly used retrospective measure. Based on the observations of Schmidt and Berri (2001), one would expect to see differences between competitive balance measures obtained from prospective measures and those derived from retrospective measures. Based on the yearly density functions produced from MLS betting odds, some of which are shown in Figure 2.3, we compute the standard deviation of expected points with the use of the formula in Equation (2.3). These yearly standard deviations can be compared to the standard deviation of actual points. The comparison is shown graphically in Figure 2.4.

Figure 2.4: Standard deviation of expected and actual points



This figure illustrates both similarities and differences among the ex-ante and ex-post standard deviations. In terms of similarities, the time patterns match closely, with a steep increase in the standard deviation from 2004 to 2005, followed by a steady decrease until 2008, and a slow rise until another dip in the last years of the period. The correlation between the standard deviations is 0.83, which further indicates that the two measures are picking up similar information on changes in competitive balance in MLS over time.

However, there are major differences in the two measures in terms of the extent of competitive balance; the ex-ante standard deviation is consistently less than the ex-post standard deviation. If the time series produced in Figure 2.4 were from two separate leagues, a researcher would rightly conclude that one of the leagues had substantially less competitive balance than the other. Furthermore, yearly changes

in competitive balance differ among the two measures. For instance, while the expected points show more dispersion in 2011 than in 2010, actual points show the opposite. Different changes are also found in 2013 and 2014 compared with 2012 and 2013, respectively.

The difference in yearly magnitudes of the ex-post and ex-ante measures likely reflects the influence of unexpected events. If unexpected events occur during games, e.g., early red cards, betting lines, which are primarily based on the talent of teams and players, will fail to predict results accurately (Bowman et al., 2013a). This effect is most obvious in the short-run, i.e., game level, but still present in the medium-run, i.e., season level. An important implication of this comparative analysis is that unexpected events in MLS games consistently lead to estimates that indicate less competitive balance than when competitive balance is estimated using pre-game information only. In effect, using ex-post measures of competitive balance adds “error” to the measure of competitive balance, and in the case of MLS, this “error” is one-sided.

To assess further the implications of using ex-ante versus ex-post data in competitive studies, Table 2.1 reports the results of a simple regression of standard deviations on yearly average game-day attendance from 2004 to 2015. Although clearly limited in predictive power due to sample size, the regression results show the standard deviation of expected points to have more explanatory power than the standard deviation of actual points. Correlation coefficients also indicate that the ex-ante measure is more highly correlated with MLS attendance than is the ex-post measure, 0.62 and 0.24 respectively. This is in line with recent contributions on demand in sports (Pawlowski, 2013), which use probabilities of winning from odds to predict the uncertainty of outcome.

Table 2.1: Regression analysis. Dependent variable: attendance figures

Variables	Coef.	p-value	Variables	Coef.	p-value
SD of expected points	1,029.5	0.031	SD of actual points	234.94	0.456
N. of observations	12		N. of observations	12	
Adjusted R-squared	0.321		Adjusted R-squared	0.038	

2.5 Conclusions

This paper contributes to the literature that uses ex-ante information about expected competitive balance first introduced by Paul et al. (2009). By using a prospective measure in nature, this paper also incorporates a graphical approach that identifies the subtleties of competitive balance in MLS, which further develops previous contributions to this research focus (Bowman et al., 2013a,b; McEwen & Metz, 2016).

This study also shows the correlation between ex-ante and ex-post results and the implications for managerial decisions. The owners and managers of leagues can use the measures presented in this paper to understand competitive balance trends over time, as well as the influence of implementing specific policies, e.g., expansion or DP rule. Moreover, the perception of fans about the talent of teams and competitive balance in MLS is related to the ex-ante information embedded in the prospective measures.

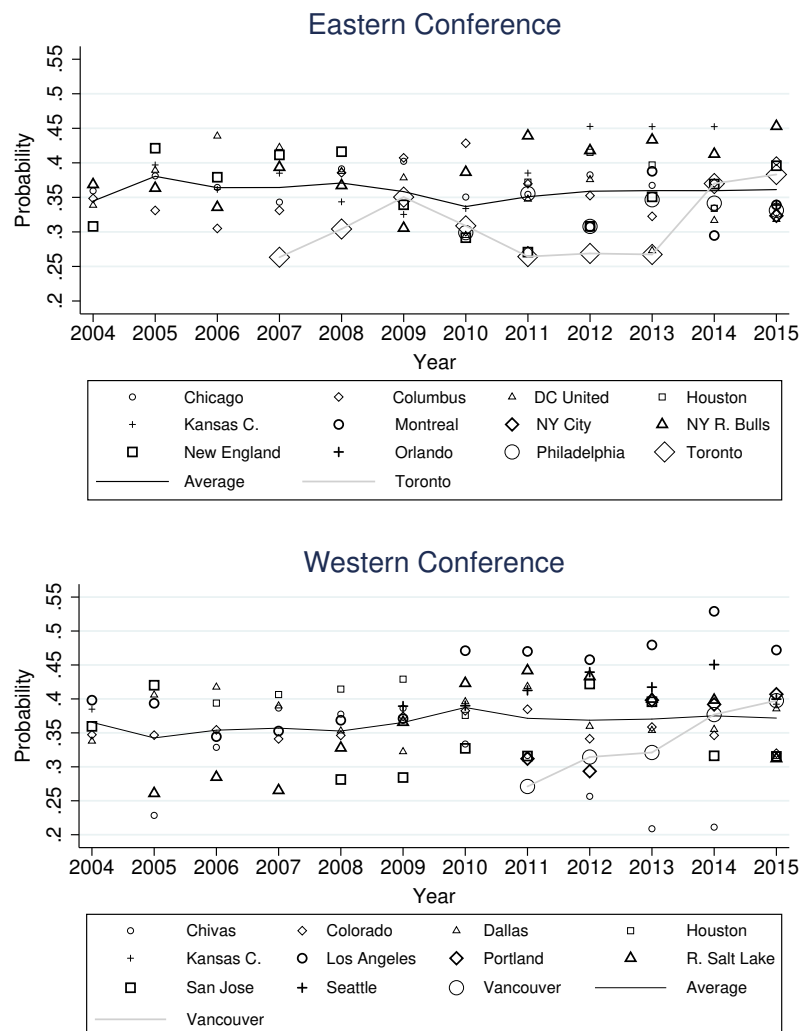
The graphical analysis of competitive balance provides the managers of clubs and leagues with the specific details of the competition over time. These details shed light on the reasons why competitive balance may hold different values in professional leagues. As professional soccer leagues have a multiple-prize format (Kringstad & Gerrard, 2007), this measure helps to identify the teams that are involved in the different mini-competitions, e.g., battling for the play-offs or battling against relegation, while additionally revealing how these measures can determine competitive balance levels.

A clear limitation of the graphical approach is the difficulty in including subtle information concerning competitive balance in statistical tests. Nonetheless, the graphical analysis of team-level density functions allows for a more thorough analysis of the complexity of competitive balance and its changes over time than does the common single-number analysis. In this way, the graphical analysis is not a replacement for statistical analysis that uses a single-number measure of competitive balance. Instead, the graphical methods we describe in this study serve as a complementary analysis, and possibly one that should be applied prior to standard regression analysis of the impact of competitive balance in sports leagues. Future contributions may expand the statistical relevance of these graphical techniques as well as applying them to leagues with other competition formats and policies than MLS.

2.6 Appendix

The analysis of the probabilities of the winning average of teams over time is another measure of long-run competitive balance. Figure 2.5 shows the evolution of Western Conference and Eastern Conference teams in MLS during the 2004 through 2015 in terms of the average probability of winning games based on betting odds. This measure serves a dual purpose: (1) to analyze visually the role of specific teams in the long-run competitive balance and (2) to track the changes in the expected performance of teams over time.

Figure 2.5: Average probability of winning by team



To interpret the graph, note that the more similar are the average probabilities among teams, the greater is the competitive balance. Moreover, crossings and variations in the positioning of teams over the years show variability and, consequently, stronger long-run competitive balance levels. For example, we observe that the conferences' expected winners change in both conferences over time. This figure is a graphical and prospective version of the top ranking teams that has been used in previous competitive balance studies (Goossens, 2006).

This measure provides a more specific follow-up of teams that can be compared to one another with respect to the implementation of strategies, such as the hiring of players. For example, Figure 2.5 highlights the evolution of Toronto (gray line in Eastern Conference) and Vancouver (gray line in Western Conference). Both teams have some similarities. They are expansion teams that come from cities that are outside the US, entered the league with low expected performance, and finally show a positive tendency. However, the main difference is that Vancouver managed to increase its expectations above the average much more rapidly than did Toronto. Similar to this measure, the density functions have the potential to isolate the evolution of specific clubs over time in the estimated distribution.

2.7 Publication and acknowledgements

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Chapter 3

Performance of coaches in European women's soccer leagues

In this paper, the authors empirically analyze the influence of the gender of the coach on team performance in women's soccer leagues. Moreover, the authors examine the role of initial experience of coaches (as professional players) as an attribute that converges with gender diversity and influences performance. The sample includes the top divisions in France, Germany, and Norway from 2004 to 2017. The results from the regression model show that the gender of the coach is not a significant determinant of team performance (points per game). In addition, the initial experience of coaches does not alter the results. Therefore, managerial decisions of clubs with regard to the employment of coaches should not rely on gender.

3.1 Introduction

Women’s sport has been growing in importance since the implementation of several policies aiming to provide this field with more opportunities, such as Title IX in the US. Consequently, the question is whether the role of women has changed along the process. Adriaanse (2016) explained the dynamics of different dimensions related to social practice, such as power, symbolism, emotions, and production, that contribute (or not) to gender diversity. Crucially, the author found the underrepresentation of women in sports governance that persists when we consider coaching positions.

The representation of women coaches is limited in European professional sports leagues (Hovden, 2013), North American high schools (LaFountaine & Kamphoff, 2016), and intercollegiate sports (Acosta & Carpenter, 2014). This issue is exacerbated in men’s sports, where men coaches benefit from a stronger position and the number of women coaches is low (Norman, 2010). In women’s sports, many researchers report and investigate the underrepresentation of women’s team coaches (Bracken, 2009; Sartore & Cunningham, 2007; Walker & Bopp, 2010). Several factors play a role in such underrepresentation.

The lack of role models (Avery, Tonidandel, & Phillips, 2008), gender-based barriers (Fielding-Lloyd & Meân, 2008), self-efficacy issues (Cunningham, Doherty, & Gregg, 2007), and the gendered coach network (Greenhill, Auld, Cuskelly, & Hooper, 2009) are obstructions for women coaches. However, few empirical works investigate the differences in performance between women and men coaches.

Darvin, Pegoraro, and Berri (2018) examined whether the gender of the coach has an influence on the individual performance of players in US women’s basketball. Our study contributes to this literature on gender and team performance with a measure that captures the results of the whole team (points per game), instead of the individual performance of players. Moreover, in our paper, we include the influence of initial experience, following Dawson and Dobson (2002). This variable identifies the coaches (both women and men) that had a professional playing career in their respective highest division leagues.

The majority of previous studies that analyze the differences in performance between women and men managers are based in the corporate setting (e.g., Ahern & Dittmar, 2012; Dezsö & Ross, 2012; Joecks, Pull, & Vetter, 2013). These analyses share the drawback that the whole company represents one team and the financial outcomes that are used to assess the performance of managers do not fully capture

the managerial influence (Kulik & Metz, 2015). It is unreasonable to assume that the decisions of the managers are decisive for performance in teams with a large number of members. In sports, the number of team members is smaller; but only women’s leagues employ, to a very limited extent, women coaches that allow for a gender comparison.

Thus, sports data offer the possibility to contribute to this literature on gender and performance with a measure that is closely associated with managerial decisions, i.e., points per game. Although coaches are not the only ones responsible for the performance of teams, and sports managers and other members have an important role in recruitment or hiring tasks, coaches’ decisions on tactics, training, and player selection are critical. Our study continues previous empirical work that analyzes team performance to assess the work of coaches in European sports (cf., De Paola & Scoppa, 2012; Koning, 2003; Tena & Forrest, 2007; Soebbing, Wicker, & Weimar, 2015; von Hanau, Wicker, & Soebbing, 2015), and includes the influence of gender.

Previous ideas from social categorization, similarity/attraction, and group fault-lines theories can help to explain the relationship between the gender of the coach and team performance in women’s sports leagues. While women players may prefer women in coaching positions, specific-context moderators, such as traditional stereotypes, can influence performance (van Knippenberg, De Dreu, & Homan, 2004). In women’s soccer, women and men coaches do not share the same experience as players, which is a job-related attribute (Homan et al., 2008) that may influence team performance (Bridgewater, Kahn, & Goodall, 2011; Dawson & Dobson, 2002).

Therefore, the aim of this study is to analyze the differences in performance between women and men coaches in European sports leagues. Moreover, we examine whether the interaction of the gender of the coach with another attribute (initial experience) has a significant influence on team performance. For this purpose, the sample includes three of the five largest women’s soccer leagues in Europe – France, Germany, and Norway - with respect to total budget (UEFA, 2015). The empirical analysis controls for several characteristics with respect to players, coaches, and teams. The results indicate that no significant differences in performance between women and men coaches explain the underrepresentation of the latter in these leagues. Also, we find that the initial experience of a coach has no statistically significant influence on performance.

The rest of the paper is organized as follows. Section 2 provides the theoretical framework’s foundation, while Section 3 reviews the literature and describes related

findings, research gaps, and contributions. Section 4 provides an overview of the data and the method, while Section 5 presents the results. Finally, Section 6 discusses the most important results with respect to prior literature on gender and performance and concludes.

3.2 Theoretical framework

Teams in sports are similar to teams in non-sport contexts. Team leaders are required to manage the human capital of teams in order to achieve pre-established goals. In women's sports, team members (players) are always women but some teams employ men team leaders (coaches). In fact, the percentage of men coaches is higher in many women's soccer leagues in Europe. This context provides an interesting opportunity to test for gender differences in performance among women's soccer coaches.

Gender diversity in women's soccer clubs occurs when the managerial team appoints a man as coach. This scenario generates diversity within two different roles (coach-player), as women team members are required to work with a man as coach. Lee and Cunningham (2018) showed that several researchers in sports investigate the role of diversity within the same role: (a) sports administrators/coaches, or (b) players, e.g., track-and-field coaches (Cunningham, 2007), NCAA I Division athletics administrators (Cunningham & Singer, 2011), or professional cyclists (Prinz & Wicker, 2016). No general consensus exists in the literature on the influence that gender diversity has on team performance. Lee and Cunningham (2018) explained that there are mainly two theoretical schools of thoughts with regard to group diversity and subsequent outcomes. On the one hand, Horwitz and Horwitz (2007) state that homogeneous teams may be more cooperative and outperform more diversified teams. This argument is in line with traditional ideas from the similarity/attraction paradigm (Byrne, 1971), or the social categorization theories (Tajfel & Turner, 1979). On the other hand, group diversity brings ideas from different perspectives and shared knowledge that enrich the group and improve performance. This reasoning is consistent with the categorization-elaboration (van Knippenberg et al., 2004) and information-decision-making (Williams & O'Reilly, 1998) models.

However, the gender diversity that occurs in women's soccer teams is unique as two different sport roles are involved (coach-player), and players are always women. This hierarchical distinction may stress the in-group and out-group feelings that

deteriorate the positive aspects of diversity. Thus, in order to derive the hypotheses in this study, we rely on social categorization and similarity/attraction theories, which suggest a negative influence of gender diversity on team performance.

3.2.1 Social categorization

The traditional arguments of social categorization theory suggest that people tend to use differences and similarities in certain attributes to create groups and categorize others into in-groups or out-groups (van Knippenberg et al., 2004). Demographic differences such as race, gender, or age are examples of this. Williams and O'Reilly (1998) explained that diversity could have a negative influence on team performance because people tend to trust in-group colleagues rather than out-group others. Frictions and disputes that disrupt the functioning of teams are more likely to appear when colleagues that belong to different demographic groups have to work together.

In professional women's soccer teams, we identify different demographic characteristics of coaches, namely gender, that can trigger the creation of categories and groups of the "us and them" nature that negatively affect performance. In this context, women players may see men coaches as outsiders that come to impose ideas, which generates frictions that prevent them from fully becoming involved with the goals of the team.

3.2.2 Similarity/attraction

According to the similarity/attraction perspectives (Byrne, 1971), team members will favor working with colleagues who share the values that are associated with gender attributes. However, the magnitude of this effect and its influence on the performance of teams depend on the proportion of men and women because they respond differently to diversity (Williams & O'Reilly, 1998). Women's sports leagues have an interesting characteristic with regard to this issue; teams are completely women-dominated groups, but some clubs employ a man as coach. In European soccer, Fasting and Pfister (2000) confirm the preference for similar others; women players in Germany and Norway, among other countries, favor women in coaching positions. If the similarity/attraction theory plays a role, and women players have a strong preference for women coaches regardless of any other attributes, then the performance of teams with a man coach deteriorates.

Thus, according to the social categorization and similarity/attraction theories, we formulate the following:

Hypothesis 1. Women's soccer teams perform better when they have a woman coach.

Beyond the influence of gender diversity, there is a characteristic of coaches in women's soccer that is relevant to our study. While the vast majority of women coaches in European women's soccer leagues have played professionally (initial experience), men coaches do not. This singularity can affect the relationship between gender diversity and performance regarding the two sport roles. To further explore this issue, we use the group faultlines theory.

3.2.3 Group faultlines

Lau and Murnighan (1998) first introduced this concept to define the multiple attributes (one or more) that have the potential to subdivide a group. The greater the number of attributes aligned in the same way, the stronger the faultline. These authors provided the example of two faultlines, i.e., age and gender, aligned in two groups: (a) women over 60 and (b) men under 30. Thatcher, Jehn, and Zanutto (2003) argued that the negative effects of diversity on performance are more likely to occur when different dimensions of diversity converge. For example, Lau and Murnighan (2005) showed that the convergence of ethnicity and gender activates the salience of groups, which results in lower expected performance.

Researchers also attempt to distinguish the different types of attributes that generate diversity and group faultlines. Van Knippenberg et al. (2004) cited studies that first made the distinction of job-related or functional diversity, e.g., attributes based on experience or education, and not job-related or demographic diversity, e.g., attributes based on gender or race. Moreover, the authors identified future research opportunities that explore the convergence of different types of attributes and their effect on performance. Similarly, Carton and Cummings (2012) referred to identity-based attributes and knowledge-based attributes and discuss the importance of accounting for the number and composition of groups.

Thus, one attribute (the gender of the coach) does not necessarily result in a categorization processes (that influence performance), but the combination with other attributes can trigger the salience (van Knippenberg, Dawson, West, & Homan, 2010). The different dimensions of diversity that can moderate the influence of

gender on performance in the context of women’s soccer teams are interesting with respect to the ideas of the faultline theory. In this setting, we can test the influence of a job-related attribute (initial experience) together with an unrelated job attribute (gender of the coach) that generates diversity in teams with women players. Initial experience is an important work-related attribute for team leaders,¹ which can have an influence on performance if it converges with gender.

Strictly speaking, men coaches cannot have initial experience in a women’s soccer league because they have never played in a female league. So, even if men coaches played in professional leagues during their playing career, they are missing key insights about women’s competitions that women coaches have gained. However, we assume that the competences with regard to tactical knowledge, physical demands, or the relationship between players are similar in women’s and men’s competitions. Therefore, in this study, we consider men coaches that have played in the highest division of a men’s competition as having initial experience. Still, it is unusual that men leading women’s soccer teams in European leagues have had a professional playing career.

Thus, the mistrust that women players might have toward men coaches (social categorization), or simply the preference for women coaches (similarity/attraction) can be exacerbated and affect team performance if, in addition, men coaches do not have initial experience. This can possibly generate a negative perception with regard to the competence of men coaches lacking initial experience. Therefore, we formulate the following:

Hypothesis 2. Men coaches lacking initial experience trigger a diversity faultline that has a negative influence on the performance of teams.

3.3 Literature review

Kahn (2000) defined sports leagues as a unique research setting to explore labor market issues because of the extensive information available about the agents. Women’s sports leagues in Europe offer an opportunity to examine gender differences in leadership positions. Still, the literature on performance differences between women and men coaches in sports is limited. Only the recent contribution of Darvin et al. (2018) shows that the gender of the coach does not improve the individual performance of

¹Several studies incorporate this variable as a determinant of coaching performance in sports leagues (e.g., Bridgewater et al., 2011).

players in professional and college US women’s basketball.

Darvin et al. (2018) analyzed the influence that the gender of the coach has on the productivity of women’s basketball players in the WNBA (19 seasons) and NCAA (3 seasons), controlling for other factors such as age and individual player’s fixed effects. They measure player’s productivity as wins produced with respect to offensive efficiency- points per possession employed - and defensive efficiency- points per possession acquired. A set of individual offensive statistics, e.g., field goal attempted, and defensive, e.g., opponents field goal made, are used to calculate employed and acquired possession.

The main result of their study is that the gender of the coach did not have a significant influence on the individual player’s productivity in any of the leagues. This study is the only precedent that empirically analyzes the gender of the coach and the performance of players in sports. And, although the research contributions are limited in sports, an extensive body of literature on gender and firm performance exists in the corporate setting. These studies do not find a consistent relationship.

Some studies demonstrate that gender diversity on the board of directors has a positive influence on revenue in large corporations (Campbell & Mínguez-Vera, 2008; Dezsö & Ross, 2012), while others find a negative relationship (Ahern & Dittmar, 2012), or a “near-zero” effect (Post & Byron, 2015). Post and Byron (2015) also show that firms with more women on the board of directors perform better in countries with more gender parity. The authors use the World Economic Forum’s Global Gender Gap score, which involves several estimations of equal opportunities for women and men in economic participation, educational attainment, health, and political empowerment (WEF, 2017). The report shows differences across countries that might be useful for explaining the results in women’ soccer.

The analogy of the performance of coaches in sports and managers in other industries is used in recent research in economics and management to explore the performance of team leaders and labor market issues such as turnovers (Humphreys, Paul, & Weinbach, 2016; Madum, 2016). In sports, we have information on coaches that is publicly available, concise measures of performance, and information with regard to the agents, e.g. previous experience of coaches as players, or the skill set of players.

Knoppers (2011) analyzed the impressions of managers in different organizational contexts and argued that the purpose of teams in the context of competitive sports is to improve performance. However, Kulik and Metz (2015) argued that

research comparing women and men in leadership positions often uses soft measures of performance, such as subordinate satisfaction; and future research could benefit from other indicators. Lee and Cunningham (2018) mentioned three major types of outcomes in their review: organizational effectiveness, affective outcomes, and team performance.

For example, Wicker, Breuer, and von Hanau (2012) reported that the presence of women managers on the board of German sports clubs significantly reduces the severity of the organizational problems perceived by these institutions. Other studies focus on the influence that gender diversity (and perceived gender diversity) within the same sport role, i.e., administrators or coaches, have on performance indicators such as the attraction of a diverse fan base, creativity, and satisfaction (Cunningham, 2008), intentions to remain in the organization (Spoor & Hoyer, 2013), or generated revenues (Cunningham & Singer, 2011); and find a positive relationship.

Thus, we contribute to the literature on gender and team performance in women's sports in several ways. First, the results include a concise measure of team performance; average points per game. This variable determines the success of teams, implicitly incorporates the managerial decisions of coaches, i.e., the selection of players that participate in the games and the tactics, and is used extensively in the literature to assess the work of coaches (e.g., Dietl, Lang, & Werner, 2009; Madden, 2012; Martínez & Caudill, 2013). Moreover, the analysis includes the influence of gender diversity within two sport roles (coach-player level).

Second, information about the skill set of the team members, who are responsible for the execution of the decisions of the coaches, is available. Although this information is not always readily available in women's sports, in this study we are able to identify players that compete in national teams and receive individual performance awards. In addition, the nationality of the foreign players (European foreign players and non-European foreign players) is included. For example, Kahane, Longley, and Simmons (2013) find that foreign workers had a significant positive influence on team performance in the NHL.

Third, the analysis identifies the coaches that were professional players. This is a job-related attribute that can provide coaches with insights about the specifics of the game in professional teams. Previous scholars in management and decision economics evaluate the initial experience of coaches and find that it has a positive influence on the performance of sports teams, including Dawson and Dobson (2002) or Bridgewater et al. (2011) in soccer, or del Corral, Maroto, and Gallardo (2017)

in basketball.

In our setting, coaches are different regarding gender and initial experience, and these differences create group faultlines. While the majority of women coaches have initial experience, men coaches did not play in the highest soccer division during their career. Thus, women players can show a preference for women coaches (similarity/attraction), which might increase if men coaches do not have this initial experience.

The analysis of coaches in European women’s soccer clubs contribute to the line of research that investigates the relationship between the gender of leaders and team performance. In contrast to Darvin et al. (2018), which is the only empirical precedent in sports, we focus on top division soccer leagues in three different countries (France, Germany, and Norway). Moreover, our results show the influence of the gender of the coach on yearly team performance (points per game), rather than on individual player’s performance.

3.4 Data and methodology

3.4.1 Sample and data collection

The sample for this study includes the women’s soccer leagues of three European countries: Germany, Norway, and France, during the period 2004–2017. Our analysis includes data from France since 2006, Germany since 2004, and Norway since 2004. The data is aggregated at the season level. We have 130 complete observations for France, 171 for Germany, and 149 for Norway. Table 3.1 provides an overview of the whole data set.

Women coaches have worked in these leagues since the early 2000s. Although the percentage of women coaches in these countries has declined since 2008, the total number is still significantly higher than in others leagues. Figure 3.1 shows the percentage of women coaches in the three leagues since 2000. While in Norway the number of women coaches is relatively stable (around 30%), in France and Germany the percentage of women coaches has been below 20% since 2012.

The data includes 28 teams from France, 26 from Germany, and 24 from Norway: a total of 78 teams. Every league consists of 12 teams. The relegation procedure is different in every league and has not been consistent over time. In total, our

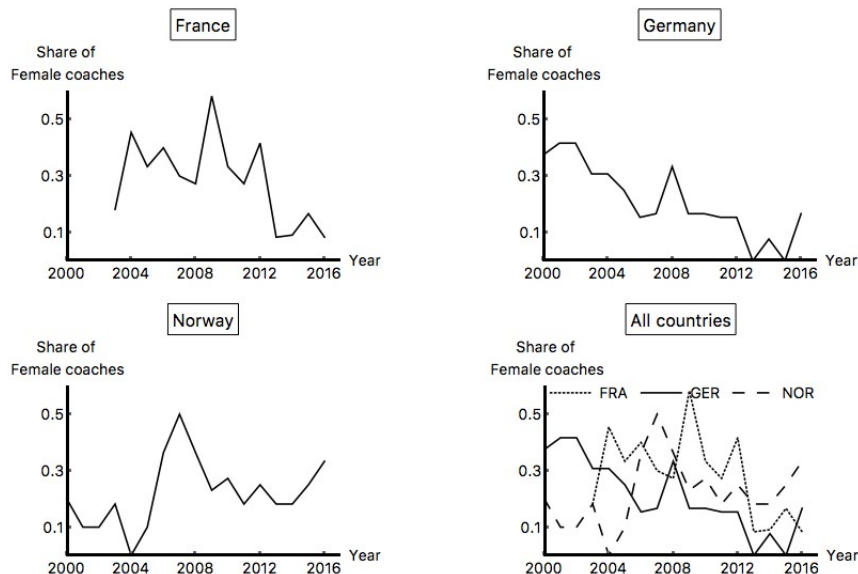
Table 3.1: Summary statistics of the sample by country

Variables	All countries		France		Germany		Norway	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Points per game	1.390	1.411	1.452	1.391	1.430	1.365	1.350	1.378
Player of the year	0.070	-	0.067	-	0.070	-	0.057	-
Players Top 10 FIFA ranked	4.792	4.508	5.674	5.271	3.234	3.483	5.621	4.281
Players Top 11-20 FIFA ranked	0.389	0.831	0.052	0.223	0.474	0.811	0.486	0.941
Players Top 21-30 FIFA ranked	0.349	0.759	0.170	0.481	0.671	0.987	0.179	0.469
Players Top 31-200 FIFA ranked	0.644	1.073	0.607	0.829	1.240	1.389	0.071	0.332
Men coach	0.755	-	0.711	-	0.873	-	0.814	-
Women coach -initial experience	0.148	-	0.163	-	0.127	-	0.186	-
Women coach -no initial experience	-	-	0.126	-	-	-	-	-
Coach age	42.443	8.391	41.570	7.353	45.658	9.588	40.686	6.867
Coach years with a club	1.399	0.172	1.274	0.747	1.703	1.469	1.164	0.489
Population -10 km radius	379,658	658,212	622,082	1,010,904	394,546	399,761	156,566	373,844
Foreign European players	1.254	1.826	0.496	1.269	2.260	2.124	0.764	1.221
Foreign non-European players	0.553	0.989	0.874	1.136	0.614	1.027	0.243	0.698
Number of observations	460		135		173		152	

Note: Standard deviations for dummy variables are not reported.

data includes 107 coaches. The sample omits coaches who coached for less than five matches. If a team changes a coach in one season and both coaches coach more than five matches, then we include both coaches.

Figure 3.1: Share of women coaches in the European leagues (2000-2017)



The information comes from various sources. For the data about coaches (name, age, and experience as a coach with one club), leagues statistics (ranking of teams, goals, and match attendance), and players (position, international participation, individual awards, and nationality) we use the websites www.weltfussball.de and www.transfermarkt.com. Authors who use this source in sports analyses include Hardman and Iorwerth (2014), and Parsons and Rohde (2015).

Some observations for the name and age of the coaches were missing in the early years. Therefore, we contacted the soccer clubs or the appropriate federation directly. We omitted approximately 0.5% of the data because either the gender or the age of the coach was unclear or untraceable.

No reliable information about previous experience in coaching for other clubs was available. Finally, we use data from the Fédération Internationale de Football Association (FIFA) for information about aggregate team information, such as national team ranking.

3.4.2 Method and variables

The empirical model is as follows:²

$$Points\ per\ game_{it} = \alpha_0 + \beta_1 Gender_{it} + \rho W_{it} + \phi X_{it} + \psi Z_{it} + \delta_t + \epsilon_{it} \quad (3.1)$$

Where:

i is a coach and t is a season

δ_t are season dummies

ϵ_{it} is a random error term

We use a fixed effects regression (team and season) to estimate the model. In France, the model includes an additional specification that aims to test Hypothesis 2. This is an interaction term for gender and initial experience ($Gender_{it} \times initial\ experience_{it}$). It is also reasonable to include a more extensive interaction variable which combines gender, initial experience, and the age of the coach ($Gender_{it} \times initial\ experience_{it} \times age_{it}$). This variable can test if the age of the coaches depending on their gender and their initial experience has an effect on winning percentage. However, the results of the two approaches are very similar, so we decided to include only the simpler interaction variable in the paper. The estimation includes the following variables:

Points per game. The primary outcome for team performance is points per game (dependent variable), which shows the winning percentage of a team, coached by coach i in season t . This is the most complete measurement available to approach the success of teams. Several authors identify points per game as the focal point for professional team sports clubs in Europe (e.g., Dietl, Lang, & Nesseler, 2017; Madden, 2012; Vrooman, 1995).

Coach variables. The analysis includes the gender of the coach, the main independent variable in our study, as an explanatory variable of points per game. 71.1% of the coaches in France, 87.3% of the coaches in Germany, and 81.4% of the coaches in Norway are men.

Vector W is a set of coach variables. The age of the coach and the experience as a coach with a team are incorporated as control variables. The average age of the coaches in France is 41.57, 45.66 in Germany, and 40.69 in Norway. Initial ex-

²We conducted the same analysis with a lagged dependent variable. However, the results do not change and therefore, we do not include the model in the paper.

perience, defined as having played in the highest soccer league (professional playing career), is also included. This variable is an important control variable in our research question and determines the structure of the analysis. Initial experience is a binary variable, as we cannot measure the experience of all coaches in years. For example, we are not able to track the years that women coaches who worked in France, Germany, or Norway at the beginning of our analysis played in the highest leagues in the 1980's or 1990's. Additionally, we cannot obtain detailed information for most foreign coaches. Thus, a binary variable is a sensible way to distinguish between coaches that have initial experience and those who do not.

Due to the background of coaches in the different countries, this specification diversified our groups of analysis. Thus, we have three groups in France: men, women without initial experience, and women with initial experience. However, in Germany and Norway, there are not enough women coaches without initial experience. In Germany all women coaches have had initial experience. In Norway, less than 5% of all women coaches have no initial experience.

Consequently, we compare two groups in Germany and Norway: women with initial experience and men without initial experience. Thus, we test Hypothesis 2 only in France, for which we use an interaction variable for women coaches which have no initial experience. Coach experience with a team measures the years of experience as a coach with a team. The average coach experience with one team is 1.274 years in France, 1.703 in Germany, and 1.164 in Norway.

Team variables. Vector X is a set of team variables. People living nearby are included in the model to account for the resources of teams. We control for the total population within a 10 km radius who can attend a game (cf., Buraimo & Simmons, 2009; Forrest, Simmons, & Feehan, 2002). In France 622,080 people live, on average, within a 10 km radius, 394,546 people in Germany, and 156,566 people in Norway. For the analysis we divide the number of the total population within a 10 km radius by 10,000.

Moreover, we include a measurement for team diversity. Kahane et al. (2013) examine how team diversity affects the performance of NHL teams. They find that foreign workers increase team performance. Similar to their analysis, we include a variable that includes the number of foreign European and foreign Non-European players. We define all countries as European which are member states of the Union of European Football Associations (UEFA). The average number of foreign European players per team in France is 0.496, 2.260 in Germany, and 0.764 in Norway. The

average number of foreign Non-European players per team in France is 0.874, 0.614 in Germany, and 0.698 players in Norway.

Player variables. Vector Z is a set of playing talent variables. The skill set of the players that form a team will also influence the performance of the coach. In several models for professional sports leagues, players are the most important expenditure for the budget of a team (Dietl et al., 2009; Dobson & Goddard, 2001). Unfortunately, information regarding budgets and financial expenditures on players is unavailable in women’s soccer leagues. The following variables are used to differentiate the skill level of the players in the league.

Naturally, national coaches try to choose the best players for their teams. Accordingly, we distinguish between players who play for a national team and those who do not. To further assess players’ skills, the FIFA national ranking is used to detect if players are playing for a high- or low-ranked national team. In this ranking, the performance of a national team is evaluated and compared with all other national teams. Moreover, to clearly assess the number and skills of international players, we divide the FIFA ranking into four categories and identify the number of players on a team playing in these categories.

Thus, we introduce the variables of national players from Top 10, Top 11–20, Top 21–30, and Top 31–200 FIFA-ranked nations. The average number of Top 10 players per team in France is 5.674, in Germany 3.234, and in Norway 5.621. The average number of players from lower ranked nations is lower for all countries. The variable player of the year, identifies teams that have recipients who received this award in the roster. This variable detects playing talent which might not be visible in the FIFA ranking.

3.5 Results

Model 1 in Table 3.2 (on the left hand side) shows the results of the empirical model when we pool the complete data set for all countries into one model. We include a dummy variable for every country in Model 1. We further include season dummies and team fixed effects for all the Models. The results for Model 1 reveal that men coaches do not outperform women coaches (or vice versa). To analyze whether differences exist across the leagues, we split the analysis into three models. Additionally, we show two regressions for France.

Table 3.2: Regression analysis. Dependent variable: points per game

	All countries		France		Germany		Norway	
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Woman coach x initial experience	0.013 (0.047)	-0.148 (0.123)	-0.127 (0.122)	-0.059 (0.064)	0.058 (0.113)			
Man coach	omitted	-0.032 (0.225)	omitted	omitted	omitted			
Woman coach x no initial experience	-	omitted	-	-	-			
Coach age	0.000 (0.004)	0.009 (0.005)	0.009 (0.008)	0.004 (0.004)	-0.024** (0.009)			
Coach years in the club	0.106 (0.077)	0.102 (0.182)	0.100 (0.179)	-0.087 (0.110)	0.121 (0.103)			
Player of the year	0.336*** (0.084)	0.370 (0.200)	0.370 (0.195)	0.156 (0.120)	0.481** (0.143)			
Players Top 10 FIFA ranked	0.030*** (0.009)	0.028 (0.020)	0.028 (0.019)	0.088* (0.034)	0.020 (0.135)			
Players Top 11-20 FIFA ranked	0.042 (0.045)	0.277 (0.393)	0.277 (0.389)	0.158* (0.078)	-0.070 (0.101)			
Players Top 21-30 FIFA ranked	-0.011 (0.046)	0.072 (0.214)	0.075 (0.206)	0.103 (0.060)	-0.172 (0.120)			
Players Top 31-200 FIFA ranked	-0.061 (0.046)	0.050 (0.143)	0.051 (0.140)	0.037 (0.050)	-0.330 (0.173)			
Foreign European players	-0.009 (0.041)	-0.009 (0.109)	-0.010 (0.107)	-0.121* (0.057)	0.164 (0.108)			
Non-European players	-0.011 (0.039)	0.009 (0.105)	0.007 (0.100)	-0.109* (0.055)	0.179* (0.084)			
Population 10 km radius	0.001 (0.001)	-0.000 (0.004)	-0.000 (0.004)	-0.010 (0.021)	0.004 (0.003)			
Team FE	Yes	Yes	Yes	Yes	Yes			
Season dummies	Yes	Yes	Yes	Yes	Yes			
Country dummies	Yes	No	No	No	No			
Constant	0.416 (0.263)	1.557 (1.592)	1.538 (1.554)	0.859 (1.033)	1.403 (0.651)			
Number of observations	450	130	130	171	149			
Adjusted R-squared	0.731	0.772	0.776	0.749	0.679			

Notes: a. Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05. b. All models are clustered at the coach-team level. c. The variable Population 10 km radius is divided by 10,000.

In Model 2, we compare men coaches, women coaches with initial experience, and women coaches without initial experience. We use model 2 to test Hypothesis 2. Model 3 compares the performance of all women coaches (with and without initial experience) and men coaches for France. Model 4 and 5 use the same empirical approach as Model 3 but for Germany and Norway, respectively.

Model 2 does not show significant results for initial experience. Men coaches and women coaches with initial experience and without initial experience do not outperform each other. Women coaches with initial experience and men coaches achieve similar results in their teams in France, Germany, and Norway.

The control variables that account for the talent of teams show the expected results; a significant and positive influence on the average points per game of teams. Thus, having the player of the year ($p < 0.001$) or players that compete for national teams ranked within the FIFA Top 10 ($p < 0.001$) significantly increases the performance of teams in the pooled model. However, in the individual models the variable for the player of the year is only significant in Norway ($p < 0.01$). Having players that compete for national teams ranked within the FIFA Top 10 or Top 11-20 is significant only in Germany ($p < 0.05$). Foreign players have a statistically negative effect in Germany ($p < 0.05$), while in Norway, Non-European players have a positive effect ($p < 0.05$).

The age of the coach has a negative effect in Norway ($p < 0.01$). The population living within a 10-km radius does not have a significant influence. Although Buraimo and Simmons (2009) find a positive relation between the population living close and attendance at English professional men's soccer, our results demonstrate that this population is not a determinant of team performance. The variables for players from national teams within the FIFA Top 21-30 or Top 31-200 and the coach years with a club have no statistically significant effect on team performance.

3.6 Discussion and conclusions

We examined whether women and men coaches have significant performance differences that could explain the limited representation of women in these positions. We used average points per game at the end of the season to compare the performance of coaches, which is similar to the literature on coaches' dismissals (Koning, 2003; Tena & Forrest, 2007).

The results from Models 1, 3–5 confirm that the gender of the coach does not have a significant influence on team performance in France, Germany, and Norway. The average points per game of women and men coaches in these leagues is not significantly different after controlling for the characteristics of coaches, teams, and players. Therefore, the results do not provide empirical support for Hypothesis 1, and the expected negative influence of gender diversity within two sport roles is not corroborated.

According to the theoretical school that relies on social categorization and similarity/attraction, the potential preferences of women players for similar others in coaching positions could have a negative impact on team performance. However, the gender of the coach does not have a negative influence on team performance in the analyzed women’s soccer leagues. This differs from previous findings on gender diversity and performance (Horwitz & Horwitz, 2007; Williams & O’Reilly, 1998). Therefore, the results are in line with the findings of Lee and Cunningham (2018), who suggest that group diversity is not related with team performance outcomes. Moreover, Lee and Cunningham (2018) showed in their review that although group diversity is positively associated with subsequent outcomes in college and non-profit sports, it has no effect in the professional setting.

In women’s sports, the women-dominated composition of teams and the masculine hegemony of leaders in the sports context influence the relationship between gender and performance. Fasting and Pfister (2000) show that women players in women’s soccer leagues in Germany and Norway have a preference for women coaches with respect to communication and psychological abilities. However, our results confirm that this preference does not significantly influence team performance. Meanwhile, Konrad, Winter, and Gutek (1992) argue that sexist stereotypes are not as harmful for men in women teams as they are for women in men’s teams. Moreover, the masculine hegemony in sports legitimizes and naturalizes the role of men as team leaders both in women’s and men’s competitions (Walker & Bopp, 2010), which can diminish the influence of preferences for in-group coaches in sports.

Although we focus on the interaction between the gender of coaches and players, some ideas from the literature on gender diversity and performance are useful to explain the results. Williams and O’Reilly (1998) concluded that the negative effect of gender diversity on group performance is not always corroborated. Moreover, findings from van Knippenberg et al. (2004) reveal that diversity attributes such as gender cannot be directly linked to differences in team performance, while Homan et al. (2008) identify moderator factors that can determine the relationship

between gender diversity and performance, such as the characteristics of team members, e.g., the willingness to experience and consider unfamiliar ideas (“openness to experience”).

The influence of gender on the performance of teams in women’s sports is complex due to the existence of stereotypes. Some jobs are more strongly associated with stereotypic beliefs about gender differences than others, e.g., construction work or truck driving (van Knippenberg et al., 2004). This masculinity has traditionally been present in sports, where women were considered weak and men were associated with a more dominant coaching or management style (Walker & Bopp, 2010). Other studies report negative stereotypes of women in leadership positions regarding their lack of effectiveness as leaders (Sanchez-Hucles & Davis, 2010).

Along these lines, stereotypes and beliefs affect the perceived capacity of women to perform as coaches (Norman, 2010; Sartore & Cunningham, 2007) and determine the positions of men and women with little regard to performance measurements (Burton, 2015; Darvin et al., 2018; Fink, 2016). Thus, although women players have preferences for women coaches who belong to their “us” group, they constantly see men coaches monopolizing men’s competitions, and are also active in women’s teams. This positive perception of men coaches can reduce the salience of social categorization (van Knippenberg et al., 2004) and its effect on team performance.

This finding is relevant for the literature on gender and performance because a limited number of empirical papers analyze this issue in sports. The results from this study are in line with previous findings of Darvin et al. (2018), who challenge the stereotypical thinking about gender in leadership positions in women’s basketball. They demonstrate that the gender of the coach does not significantly improve the individual performance (defensive and offensive efficiency as points scored and surrendered with respect to time of possession) of college and professional women’s basketball players in the US. Our study differs from Darvin et al. (2018) in the analysis of another professional women’s sport (soccer) in a different context (European countries) and the use of a different indicator of performance to assess the work of coaches.

These results contribute to the literature that examines the influence of gender with a measure of team performance, average points per game, that is able to capture the managerial influence of leaders due to the small number of team members (Kulik & Metz, 2015). Along these lines, Wicker et al. (2012) find that the presence of women in the board of German sports clubs minimizes the severity of perceived

organizational problems. These organizational issues refer to internal and external elements such as the recruitment and retention of members, analysis of demographic changes, and the financial situation of the club. Our findings cannot confirm that women coaches have a similar positive influence on the performance of teams in the German women soccer league. However, our results demonstrate that team performance is not the reason why women coaches are underrepresented in this women's soccer league. Fasting and Pfister (2000) argue that men's dominance in coaching is embedded in the culture and structure of sport.

The literature on group faultline theory introduces the idea of multiple dimensions of diversity that subdivide groups (Lau & Murnighan, 1998) and the negative impact that the convergence of some dimensions has on performance (Thatcher et al., 2003), such as ethnicity and gender (Lau & Murnighan, 2005). However, the results from this study do not support Hypothesis 2. Some women coaches working in France do not have initial experience, which generates a diversity faultline, i.e., men coaches without initial experience, women coaches without initial experience, and women coaches with initial experience. Team performance is not significantly different for any of these groups.

Initial experience, which is a job-related attribute of diversity (van Knippenberg et al., 2004), does not influence the relationship between the gender of the coach and team performance, even when gender diversity occurs within two different sport roles (coaches and players). The results from this study differ from the results of Dawson and Dobson (2002) and Bridgewater et al. (2011) in soccer, and del Corral et al. (2017) in basketball. Thus, the unimportance of initial experience challenges the notion that women should not coach men's sports teams because they have not played in these leagues (Walker & Bopp, 2010).

Future research should consider the need to further explore the influence of team composition and sport roles. Unfortunately, there is no setting in which women leaders are managing a man-dominated group, as women coaches are scarce in men's sports competitions (Walker & Bopp, 2010). If women's soccer in Europe keeps growing in importance, future researchers could incorporate the effect of diversity of the coaching staff. However, as women's soccer leagues in Europe are still developing, many teams do not have assistant coaches for the analyzed period, or else the information is untraceable.³

³Some teams cannot employ coaches full time, so they even have to look for second occupations. For example, Régis Mohar, coach of VGA Saint-Maur, had to work in a laboratory to complement his job as a coach (Detout, 2015).

The analysis of other sports leagues in countries with different conditions regarding gender equity can help to shed light on this issue. Post and Byron (2015) argue that firms with more representation of women on the board of directors perform better in countries that rank higher in the World Economic Forum’s Global Gender Gap score. The current study does not find differences across leagues, but the three countries, i.e., Norway (2), France (11), and Germany (12) rank within the top 15 in the overall Global Gender Gap Index (WEF, 2017). Future studies could perform similar analyses in countries that include more differences regarding gender equity conditions.

The lack of detailed data and quantitative measures in women’s sports limit the extent of the analyses, which is a recurring problem in the literature (Valenti, Scelles, & Morrow, 2018). By reducing the sample and putting the focus on one country, future research could be able to find more detailed information regarding players (salary, background, and talent), coaches (salary, education, type of coaching diploma, coaching experience, assistants), and managerial team (proportion of women on the board of the clubs). This would allow future research to test theoretical perspectives regarding team composition and other dimensions of diversity that can moderate the influence of gender.

Despite the data limitations with regard to women soccer leagues, we make an effort to empirically compare the performance of women and men coaches in the context of women’s sports. This contribution points toward the need of incorporating quantitative methods and data to the research on women’s soccer in economics and management (Valenti et al., 2018). Our results show that the gender of the coach does not have an influence on team performance (points per game -on a yearly basis), and, therefore, cannot justify the underrepresentation of women coaches in professional women’s soccer leagues.

3.6.1 Managerial implications

The main goal of European soccer clubs is to maximize the winning percentage (cf. Dietl et al., 2009; Madden, 2012). The coach is employed to pursue the objectives of the club and deliver the best possible results with the players that are available. When a club hires a new coach, several factors play a role. For example, the club might be interested in the coaches’ previous experience as a player, age, coaching experience, or gender.

In France and Germany, the percentage of women coaches has been below 20% since 2012 in women’s soccer. Both countries used to have significantly higher percentages; between 30% and 50%. Currently, in Norway, only one third of the coaches are women. An economic explanation for the low percentage of women coaches could be that they are underperforming compared to men coaches. Thus, a club would maximize its winning percentage when hiring a man as coach. However, this assumption is not supported by the results of the current study. After controlling for several factors with regard to players’ skills, clubs’ characteristics, and coaches’ experience and age, we do not find that either women or men coaches outperform each other. The result is the same in every league in our analysis. Accordingly, the decision of clubs regarding the hiring of a new coach should not depend on the gender of the coach.

In Germany and Norway, all women coaches have experience as a player. However, this is not the case in France, where some women coaches have no initial experience. The experience as a player of a coach might have an influence on the hiring decisions of teams. Some studies show that it has a positive influence on team performance (e.g., Bridgewater et al., 2011). However, the results from our study show that initial experience of coaches as a player does not influence the performance of teams. Thus, women’s soccer clubs that need to employ coaches should consider carefully whether to attribute importance to initial experience in the decision-making process.

3.6.2 Concluding remarks

Our research provides empirical evidence with regard to gender differences in performance among coaches in women’s sports by using a result-oriented measure (points per game). For this purpose, the paper uses data from the women’s professional soccer leagues in France (2006–2017), Germany (2004–2017), and Norway (2004–2017). The results illustrate that the performance of teams coached by women and men is not significantly different. The analysis controls for the characteristics of teams, players, and coaches that can have an influence on the number of victories.

We find that performance differences between women and men coaches are not the cause of the underrepresentation of women in the examined leagues. Moreover, the results suggest that gender diversity within two sport roles (coach-player levels) does not have a significant impact on team performance (points per game).

Finally, we analyzed the influence of the initial experience of coaches on the performance of teams. This dimension of diversity, which may generate group faultlines when converging with the gender of the coach - women coaches with and without initial experience, and men coaches without initial experience - does not have a significant influence on performance.

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Chapter 4

Racial differences in the labor market. NBA head coaches

Professional basketball in the US provides an opportunity to test for racial differences in the labor market. In contrast to other economic sectors, black Americans are well-represented in influencing leadership positions as head coaches in the National Basketball Association (NBA). This paper investigates the influence of the race of the coach on dismissal decisions. The analysis uses several probit models that control for team performance, coaches' characteristics, and effectiveness -as performance relative to expectations (from betting odds). The data include coach-team information over a 20-year period in the NBA. The results, in contrast to other studies, show that black head coaches are more likely to be fired and less prone to quit.

4.1 Introduction

Racial discrimination was a fact “too evident for detection and too gross for aggravation” in the American society of the first part of the 20th century (Arrow, 1998, p. 92). Black Americans had limited access to influencing jobs, which prevented them from creating a social network in many industries (Ibarra, 1995). Although black Americans still face barriers to access leadership positions in some sectors, they have successfully reached top positions in professional sports, particularly in basketball. However, the number of black head coaches is still low in comparison with the predominance of black players in the rosters of professional basketball teams in the US (Lapchick & Balasundaram, 2017). This is surprising as coaches with a successful playing career tend to be better leaders in the NBA (Goodall, Kahn, & Oswald, 2011).

The question that still arises is whether black Americans receive an unequal treatment in influencing positions of a high-skill labor setting. If racial preferences determine top positions in the workplace, both the social role of minorities (Arrow, 1998) and the wealth of firms and organizations (Becker, 1957) are at risk. However, the impossibility to estimate accurate measures of individual performance in many industries and the lack of big penalizations for underperforming members in certain market structures, e.g., NBA, still allow a taste for discrimination. In economics, many papers examine this issue by analyzing, for example, rates of employment (Riach & Rich, 2002), wages (Charles & Guryan, 2008), or seniority (Altonji & Blank, 1999) of employees from minority groups in different labor settings. Most contributions do not examine racial differences in managerial positions due to the limited representation of minority groups.

This paper refers to the extensive body of literature that examines the determinants of team leaders’ dismissals in business firms (e.g., Farrell & Whidbee, 2003), and specifically in sports (e.g., Humphreys, Paul, & Weinbach, 2016). This literature often includes factors related to age, education, experience, and team/firm performance. In sports, recent papers introduce the variable of expected results as a benchmark to investigate the performance of coaches and its influence on dismissals (e.g., van Ours & van Tuijl, 2016). By using the performance relative to expectations (difference between expected and actual results), we create a variable of coaching effectiveness and analyze the relationship between the race of head coaches and the probability of being fired in the NBA.

The analysis of racial differences in competitive sports, especially basketball, is relevant due to three main reasons: (1) the representation of black Americans in leadership positions as coaches; (2) the visibility/availability of the results of the teams; (3) the large salaries and compensations at stake.¹ The efforts of Kahn (2006), and Fort, Lee, and Berri (2008), who introduce efficiency to detect racial discrimination practices in the retention of NBA coaches, are two noted precedents. Both studies find no significant differences by race, but our results show otherwise.

The contribution of this study to the literature on racial discrimination is twofold. First, the paper analyzes the effectiveness of coaches by introducing a method that uses data from betting odds. This approach is informative as betting markets use all available information to set accurate outcome probabilities (Sauer, 1998) and incorporate the expectations of fans, who can influence the decisions of teams (Fort et al., 2008). Second, the analysis includes measures of performance in the decisive rounds of the competition (playoffs) and covers a more recent period (1993-94 through 2016-17), which extends the results of previous papers.

4.2 Literature review

The international activist movement Black Lives Matter emphasizes the argument that the residue of discrimination still affects areas such as education, health care, and labor in the US (Deruy, 2016), which research supports (Pager & Shepherd, 2008). Field experiments often find evidence of discrimination in the labor market. Beginning with Bertrand and Mullainathan (2004), correspondence studies featuring made-up resumés detect racial biases. For example, Pager, Bonikowski, and Western (2009) demonstrate that black applicants are half as likely as equally qualified white applicants to receive a callback from a job offer in New York City. In the sharing economy, Edelman, Luca, and Svirsky (2017) show that black Americans receive 16% less acceptance calls than White Americans in a short-term housing rental portal, i.e., Airbnb.

Professional sports leagues offer the possibility to investigate the labor conditions of black Americans in the top positions of a highly competitive labor setting. In US basketball, some black Americans have reached influential positions as coaches in

¹Hoopshype (2016) shows that the salaries of head coaches in the NBA are far above the average salary in the US. Moreover, these coaches sign for several years. At the top of the list, we find Gregg Popovich (\$55 million, 5 years at San Antonio Spurs) or Doc Rivers (\$50 million, 5 years at LA Clippers).

professional (NBA) and college (NCAA) leagues. Still, it remains unclear whether black Americans are treated differently once they enter this labor market. The share of black coaches remains low in comparison to the number of black players, especially as successful coaches tend to be former players (Goodall et al., 2011). In the NBA, Lapchick and Balasundaram (2017) report that while the percentage of black players is close to 80%, the percentage of black head coaches is only 30%. Our paper includes the career records of coaches to investigate determinants of dismissals.

The performance of teams is an important determinant of dismissal in many sectors (Brickley, 2003). However, the variables to measure performance are not always straightforward and able to capture the managerial influence of leaders (Kulik & Metz, 2017). This is especially problematic in organizations where teams are composed of a large number of members. The sport setting provides detailed measures of team performance such as the winning percentage, which is widely used in research in economics (e.g., Dietl, Lang, & Werner, 2009; Idson & Kahane, 2000).²

Moreover, in sports competitions, the same winning percentage of two teams has different implications if they do not have similar human capital, objectives, and expectations. In the NBA, Wangrow, Schepker, and Barker (2018) analyze the dismissals of coaches and include team expectations based on previous winning percentage, attendance figures, and salaries. Our study also controls for the expectations of teams, but we use information from betting odds. Specifically, we identify game outcome probabilities, and then calculate an index of coaching effectiveness.

Some studies identify biases in the betting market such as bettor sentiment (Levitt, 2004) or team-related benefits (Paul & Weinbach, 2009). However, empirical contributions confirm the possibility to use odds to accurately predict game outcomes, following the paper of Sauer (1998). The nature of the relationship between bookmakers and bettors makes this market efficient. While the former need to use all the information available to set accurate odds that prevent bettors from finding gaps to exploit, the latter place their bets on games to earn a profit. Thus, this market avoids unrealistic estimations of game outcomes on both sides and allows research to obtain the embedded probabilities of an event to occur (Wolfers & Zitzewitz, 2006).

²The literature on determinants of coach dismissal includes other measures of team performance. Some examples are ranking positions (Bachan, Reilly, & Witt, 2008), changes in ranking (d’Addona & Kind, 2014), prior results (Audas, Dobson, & Goddard, 1999), points (Frick, Barros, & Prinz, 2010), and managerial efficiency (Tena & Forrest, 2007).

Previous studies also use information from betting odds to analyze team results, expectations, and coaches' dismissals. In college football, Humphreys et al. (2016) use the cumulative winning percentage (actual result) with respect to point spreads from the betting market (expected result) to assess the performance of coaches and the probabilities of dismissal. In European soccer leagues, van Ours and van Tuijl (2016) analyze the cumulative surprise (actual vs. expected points) of a team in a season. In this paper, we use a similar approach to calculate the effectiveness of coaches following the methodology of del Corral, Maroto, and Gallardo (2017). The methodology calculates effectiveness as the inverse of the probability of obtaining more wins than the actual ones using betting odds data.³ In sports, previous research notes the importance of including variables that use expectations as a benchmark to evaluate the actual results of leaders (e.g., Elaad, Jelnov, & Kantor, 2018; Pieper, Nüesch, & Franck, 2014). Betting odds are useful to extract information on expectations and analyze the determinants of coaches' dismissals.

Among the different determinants, the influence of race on the dismissal of coaches is ambiguous in the literature. In college sports, e.g., football, Mixon and Treviño (2004) show that black coaches are less likely to be fired, Holmes (2011) reports that race has little effect, and Kopkin (2014) finds that black coaches have higher probabilities of dismissal. In college basketball, LaFave, Nelson, and Doherty (2018) show that the contracts of black head coaches are more likely to be terminated earlier.

In professional sports, the results on racial disparities also differ. For example, in US football (NFL), while Madden (2004) finds that black head coaches are more likely to be fired, conditional on performance, Foreman, Soebbing, and Seifried (2018) find no statistically significant evidence of racial discrimination in dismissals. In the NBA, Hill and Remer (2018) show that race has played a significant negative role in employment outcomes of black American coaches during the last four decades. However, Fort et al. (2008) and Kahn (2006) do not find evidence that race is a significant determinant of dismissal after controlling for coaching efficiency.

³The methodology relies on the independence assumption of sports events, which other factors such as winning streaks or hot hand can challenge (e.g., Waggoner, Wines, Soebbing, Seifried, & Martínez, 2014). Other methodologies compute the difference between the number of expected wins from betting odds and actual wins, which does not need to rely on this assumption (e.g., van Ours & van Tuijl, 2016). However, the specification of the index of effectiveness used in this paper controls for the influence of being two wins ahead of expectations at gameday 5 and at gameday 82, which have different implications. In any case, if the number of games is the same, the correlation between the measure based on expected-actual results and the index of effectiveness is almost perfect.

Fort et al. (2008) use stochastic frontier models to calculate the technical efficiency of coaches, where the inputs are the contributions (statistics) of players for each team in specific positions (i.e., guard, small forward, and big men). The authors find no evidence that suggests that racial preferences determine the dismissal of NBA coaches during the period 2001-2004. Similar to these results, Kahn (2006) finds an insignificant effect of race on the probability of being fired, using hazard models with information on the teams' winning percentage and the characteristics of coaches from 1996 to 2004. In our analysis, we extend these contributions by using team performance and expectations from betting odds to calculate the effectiveness of coaches.

4.3 Data description and methods

In this paper, we use data on NBA teams and coaches that cover the period 1993-94 through 2016-17. The data come from different sources. First, we extract information on the actual results of teams from www.nba.com. Second, we gather the characteristics of coaches and their contractual relationship with teams from the official websites of teams, www.nba.com and www.basketball-reference.com.

We also use betting data from two different sources to obtain the expected results of teams. With regard to the older betting data (1993/1994-2011/2012), we use the website www.covers.com, which provides the point spreads.⁴ Prior to use the information from the spreads, we need to extract the embedded probabilities. To do so, we follow the methodology of del Corral, García-Unanue, and Herencia-Quintanar (2016) that uses a probit model to predict the win probabilities. The dependent variable takes the value one for a home win and the only independent variable is the point spread. After the estimation of this model for each season, we compute the predicted probabilities.⁵

We use the website www.oddsportal.com, which provides betting odds as decimal odds (o_e), to gather the rest of the betting data. The inverse of the odds reveals the probability of the events happening, but the odds include the profit of bookmakers

⁴Spread betting is a type of bet in which the bettors anticipate whether the outcome will be above or below the spread. Specifically, the bookmaker ascribes an advantage to the underdog (handicap) and a disadvantage to the favorite (supremacy), which results in an implied probability of 50% for both sides of the wager. As only two possible outcomes are possible in the NBA (home and away win), betting odds of 1.90 are set to both teams to ensure the over-round for bookmakers.

⁵Stern (1991) and Wolfers (2006) use similar conversion of point spread into probabilities for the NFL and NBA, respectively.

(over-round). We follow Franck, Verbeek, and Nüesch (2010) to obtain the embedded probabilities. Thus, the probability of event e occurring (P_e) is calculated as in equation (4.1). The inverse of the odds of event e is divided by the over-round. Then, the sum of the probability of the two possible outcomes in a basketball game: home win, or away win sum to one.⁶

$$P_e = \frac{1}{o_e} \frac{1}{\sum_e \frac{1}{o_e}} \quad (4.1)$$

Similar to Buraimo, Bryson, and Simmons (2017), this analysis distinguishes between coaches that decided to voluntarily leave the team and coaches that were fired. We collect the appropriate information from the official websites of teams, www.basketball-reference.com and the sport section of several newspapers. In this competitive setting, we find fewer in-season dismissals than in other leagues such as professional soccer in Germany (Frick et al., 2010) or Argentina (Flores, Forrest, & Tena, 2012). Specifically, the data shows that the average of teams without coach replacements within a season is over 86%. Another important fact about the NBA head coaching market is that very few head coaches sign for a better team, before terminating the contract in the current team (<3%).⁷

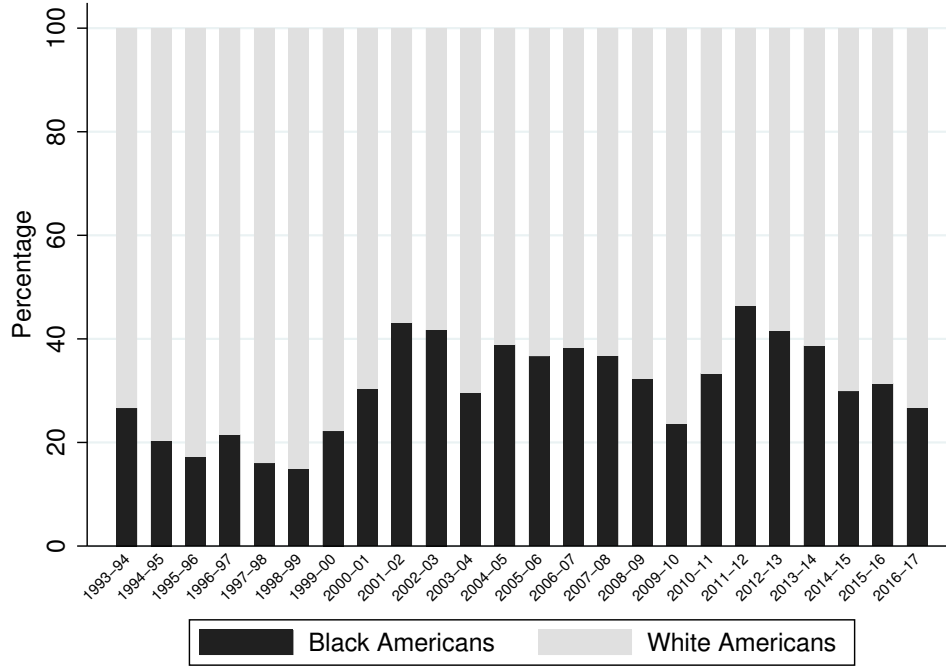
Lapchick and Balasundaram (2017) find a racial gap between players and head coaches in the NBA that finds support in our data. Figure 4.1 displays the number of games coached by black and white head coaches during the analyzed period. The number of black head coaches has increased over time, but the representation of black coaches is consistently lower. In the last 15 seasons, we identify peaks and troughs with no clear trend.

Beyond the racial composition of coaching positions in the NBA, this study provides insights about the background and previous experience of head coaches. For example, we examine if head coaches are former players of this competition (Goodall et al., 2011), and differences by race. Contingency tables analyze the relationship between the race of the coach and previous experience.

⁶For example, the closing odds for the game (H) LA Lakers vs. (A) LA Clippers on October 30, 2013 were as follows: home win (4.93) away win (1.18). The probabilities extracted from Oddsportal's odds ($1/o_e$) were: home win = 0.20 and away win = 0.85, while the final probabilities were: home win = 0.19 and away win = 0.81.

⁷We define better team, as a team with a higher winning record in the season that precedes the change. However, the low number of improvements in the sample prevents us from further analyzing the determinants of these changes.

Figure 4.1: Evolution of the percentage of games coached by race



Previous papers use the efficiency of coaches, as a determinant of dismissal, to detect racial discrimination in the NBA (Fort et al., 2008; Kahn, 2006). In this setting, we use the relationship between expected and actual results to calculate the effectiveness of head coaches, as in del Corral et al. (2017). From basic probability theory, we know that the probability of two independent events occurring equals the product of these probabilities (Stern, 1991).

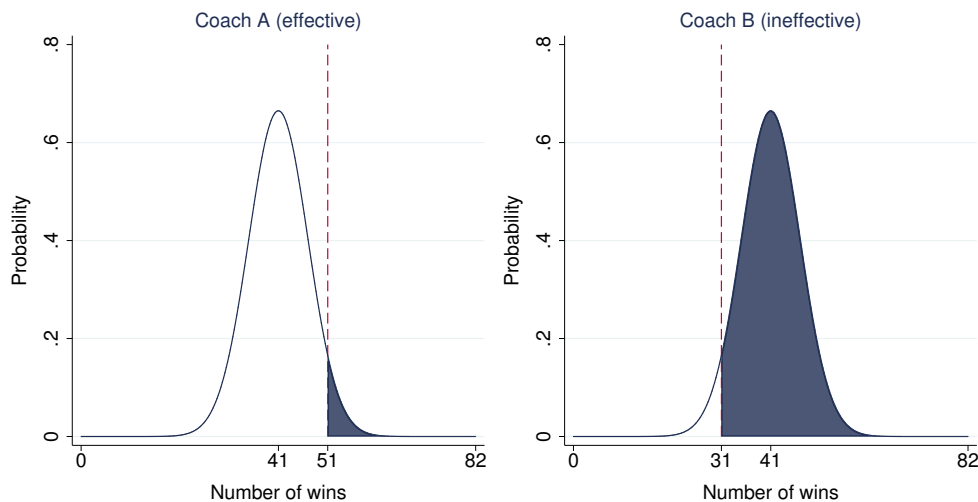
In a basketball game, we know the probability of a team winning two consecutive games by multiplying the probabilities of these two events. By doing so with the probabilities of all possible game outcomes for a team in a season (from betting odds), we calculate the density function of wins.⁸ Then, we provide a measure of coaching effectiveness by subtracting the sum of the probabilities of achieving more wins (than the actual ones) from one. The most effective coaches will obtain values close to one, while ineffective coaches will obtain values close to zero.

Figure 4.2 shows two different coaches that are expected to obtain the same number of wins at the end of the season (41). While coach A obtains more wins than expected (51 – vertical line), coach B achieves fewer wins than expected (31 – vertical line). To calculate the effectiveness of coaches, we subtract the sum of the probabilities of achieving the wins that belong to the shaded area from one.

⁸Please see Appendix 1 for more detailed explanations about this methodology.

Thus, coach A will report a value close to one (effective), while coach B will report a value close to zero (ineffective). This measure is relevant to our analysis because of two main reasons. First, we incorporate the expectations derived from the betting market to calculate the effectiveness of coaches. Second, we analyze racial differences and control for actual and relative performance of coaches.

Figure 4.2: Effectiveness of coaches



Finally, we estimate several probit models to investigate the influence of effectiveness, performance, and race on the dismissal of head coaches. In the model estimation, we use 809 observations.⁹ Thus, the data set is larger and extends the previous efforts of Fort et al. (2008) and Kahn (2006). The dependent variables of our probit models are: (1) dismissals, (2) dismissals of coaches who start the season-starting coaches-, and (3) quits.

The probit models include the following independent variables: *black* is a dummy variable that takes the value one if the coach is black American and zero otherwise.¹⁰ Following van Ours and van Tuijl (2016), we include our measure of *effectiveness*. The values of this variable are between zero (highly ineffective) and one (highly effective). We also incorporate measures of actual performance such as *team winning ratio* (which ranges from zero to one)¹¹, and dummies that account for coaches' *bad*

⁹One observation is a coach in a team in a particular season. Therefore, if a coach worked for two different teams in the same season, the analysis would include two different observations.

¹⁰Table A4 in Appendix 2 reports the complete list of coaches and the attributed race, which we consider by looking at profile pictures. The analysis only distinguishes between black and white coaches.

¹¹In our sample, the correlation between team winning ratio and effectiveness is positive, i.e., 0.622. The analysis includes robustness checks that rule out multicollinearity issues.

previous seasons (takes the value one if the coach had an effectiveness index below 0.5 in the same team in the previous season).

The models include additional variables of performance regarding the playoffs stage.¹² Qualifying for this stage is a primary goal for all the competing teams as sixteen out of thirty contestants participate. Firstly, we include a dummy variable that takes the value one if a team does not qualify for the playoffs, and zero otherwise (*no playoffs*). Then, we include a set of dummy variables that control for post-season performance: *1st round loss* (takes the value one if a team loses the conference quarterfinals, and zero otherwise); *2nd round loss* (takes the value one if a team loses the conference semifinals, and zero otherwise); *top playoffs performance* (takes the value one if a team is the NBA winner, runner-up or conference finalist, and zero otherwise).

We expect a significant positive influence of not qualifying for the playoffs on the dismissal of coaches, as it is the dividing line between failure and success in a season for most teams. Regarding the rest of post-season dummies, we expect a higher influence of being eliminated in the first round of the playoffs. Previous research in the NBA does not include playoffs measures into the analyses.¹³

Finally, we include characteristics of coaches such as the *age* (and *squared age*), *NBA winners*, *former NBA players*, and *coaching tenure at current team*, which is the number of years at their current position. Table 4.1 contains the descriptive statistics of these variables.

¹²The NBA is divided into two stages: regular-season, in which all teams compete against each other, and playoffs rounds, in which only the best eight qualified teams in each conference compete in best-of-seven (games) elimination rounds.

¹³The limited number of games increases uncertainty and multiplies the importance of external factors such as injuries or sanctions that can determine the outcomes (Berri, 2013). Therefore, it is difficult to find objective measures that capture the influence of coaches according to the potential of teams. However, the fact that all teams share the goal of qualifying (at least) for the first round of playoffs (conference quarterfinals) can provide helpful information to explain the decisions of teams to terminate coaches' contracts.

Table 4.1: Descriptive statistics

Variables	Mean	Std. Dev.	Min.	Max.
Black (dummy)	0.33	0.47	0	1
Effectiveness	0.53	0.29	0	1
Team winning ratio	0.48	0.17	0	1
Bad previous season (dummy)	0.21	0.41	0	1
Age	50.08	7.92	32	71
Coach NBA winner (dummy)	0.13	0.34	0	1
Former NBA player (dummy)	0.61	0.49	0	1
Coaching tenure at current team	2.90	2.72	1	21
No playoffs (dummy)	0.53	0.50	0	1
1 st round loss (dummy)	0.24	0.43	0	1
2 nd round loss (dummy)	0.12	0.32	0	1
Top playoffs performance (dummy)	0.12	0.32	0	1

The database includes 809 coach-season observations.¹⁴ Table 4.2 shows that the sample includes 215 dismissals, of which 123 belong to white coaches and 92 to black coaches. The ratio firings-observations is significantly larger for black coaches than it is for white coaches. Moreover, the data include 47 quits; and the ratio quits-observations is significantly larger for white coaches.

Table 4.2: Contingency table: dismissal and quit by race

	Dismissal		Dismissal ⁺		Quit	
	No	Yes	No	Yes	No	Yes
White coach	423	123	391	98	509	37
Black coach	171	92	148	68	253	10
Pearson χ^2	14.108		10.893		2.869	
p-value	0.000		0.001		0.090	
Cramer's V	0.132		0.124		-0.060	

Notes: Dismissal⁺ only considers starting coaches.

4.4 Results

First, contingency tables explore the relationships between coach race, professional background, and performance. Table 4.3 shows the relationship between the race of the coach and professional career. While the 80% of black head coaches played professional basketball, the 60% of white head coaches accessed coaching positions

¹⁴To access the database, please click on the following [link](#).

while lacking a professional playing career in the NBA. This significant result is relevant for students and athletes that want to pursue a career in professional basketball coaching.¹⁵ The data suggest that black candidates need to perform as NBA players prior to becoming head coaches in the NBA.

Table 4.3: Contingency table between former NBA player and head coach by race

NBA player	White coach	Black coach	Total
No	62 (60%)	13 (20%)	75 (45%)
Yes	41 (40%)	51 (80%)	92 (55%)
Total	103 (100%)	64 (100%)	167 (100%)

Pearson $\chi^2 = 25.376$; p-value = 0.000; Cramer's V = 0.389

The analysis also examines the relationship between dismissals and effectiveness. Table 4.4 shows the number of dismissals at different intervals of coaches' effectiveness. As expected, we find that the higher the effectiveness of NBA head coaches, the lower the number of dismissals.

Table 4.4: Contingency table between coach effectiveness and dismissal

Effectiveness	Dismissal		
	No	Yes	Total
[0-0.1)	33 (43%)	43 (57%)	76 (100%)
[0.1-0.2)	41 (55%)	34 (45%)	75 (100%)
[0.2-0.3)	43 (65%)	23 (35%)	66 (100%)
[0.3-0.4)	41 (61%)	26 (39%)	67 (100%)
[0.4-0.5)	53 (67%)	26 (33%)	79 (100%)
[0.5-0.6)	67 (82%)	15 (18%)	82 (100%)
[0.6-0.7)	77 (80%)	19 (20%)	96 (100%)
[0.7-0.8)	61 (81%)	14 (19%)	75 (100%)
[0.8-0.9)	94 (90%)	10 (10%)	104 (100%)
[0.9-1]	84 (94%)	5 (6%)	89 (100%)
Total	594 (100%)	215 (100%)	809 (100%)

Pearson $\chi^2 = 100.571$; p-value = 0.000; Cramer's V = 0.353

Moreover, we test for differences in the number of dismissals at different levels of effectiveness by race. Table 4.5 shows that the percentage of black coaches that are fired is always higher than that of white coaches at all intervals. We find the most substantial difference in the interval from 0.3 to 0.4. The percentage of black

¹⁵In our dataset, there are only four black coaches (i.e., Bernie Bickerstaff, Mike Brown, Dwane Casey, and Alvin Gentry) who did not play in the NBA and coach more than a complete season.

coaches that were fired at this interval of effectiveness in NBA (60%) doubles the percentage of dismissals of white coaches (30%). These results suggest that black coaches are held to a higher standard to keep their head coaching positions. We estimate several probit models to further test this hypothesis.

Table 4.5: Relationship between dismissals and effectiveness by race

	White coaches			Black coaches		
Effectiveness	N fired	%	N	N fired	%	N
[0-0.1)	25	53	47	18	62	29
[0.1-0.2)	19	45	42	15	45	33
[0.2-0.3)	15	33	46	8	40	20
[0.3-0.4)	14	30	47	12	60	20
[0.4-0.5)	12	26	46	14	42	33
[0.5-0.6)	8	13	60	7	32	22
[0.6-0.7)	13	19	69	6	22	27
[0.7-0.8)	8	15	54	6	29	21
[0.8-0.9)	6	8	71	4	12	33
[0.9-1]	3	5	64	2	8	25
Total	123	23	546	92	35	263
Pearson χ^2	67.182			35.469		
p-value	0.000			0.000		
Cramer's V	0.351			0.367		

Table 4.6 contains the results of three probit models.¹⁶ The first model analyzes the dismissals of all coaches, the second model only includes the starting coaches, and the third model examines quits.¹⁷ The results show that the better the performance, the less likely the exit. The coefficient of the effectiveness index is negative and significant in the models of dismissals (1 and 2). Moreover, when teams do not qualify for the first round of playoffs, they are more likely to fire the coach ($p < 0.01$), who is also more likely to quit ($p < 0.10$). The rest of post-season dummies are not significant, except for being eliminated in first round, which significantly increases the probabilities of the coach being fired ($p < 0.05$ in model 1 and $p < 0.10$ in model 2).

¹⁶A logit regression is equally appropriate for this analysis. The results do not differ from the ones presented in the paper and are available upon request. Moreover, we also estimate a multinomial logit in which the dependent variable takes the values: zero-if a coach continues in the same team, one-if a coach resigns, and two-if a coach is fired. Similar to the logit, the results do not differ from the ones presented in the paper and are available upon request.

¹⁷We use the sum of the fraction of zeros correctly predicted plus the fraction of ones correctly predicted as proposed in Kennedy (2008, p. 249) to analyze the goodness-of-fit of the models. The values equal and exceed the unit in all models: (1. Dismissal) = 1.27, (2. Dismissal –starting coaches) = 1.28, (3. Quit) = 1. We use the command estat class in Stata to calculate the values correctly predicted. The tables are available upon request.

Table 4.6: Probit regression results

Variables	(1) Dismissal		(2) Dismissal ⁺		(3) Quit	
	Coef.	ME	Coef.	ME	Coef.	ME
Black (dummy)	0.280**	0.073	0.254*	0.062	-0.325*	-0.034
Effectiveness (0-1)	-1.124***	-0.293	-1.222***	-0.297	-0.428	-0.045
Team winning ratio (0-1)	-0.419	-0.109	-0.045	-0.011	0.490	0.051
Bad previous season (dummy)	0.049	0.013	0.127	0.031	0.336*	0.035
Age	0.030	0.008	0.098	0.024	-0.255***	-0.027
Squared age	0.000	0.000	-0.001	0.000	0.003***	0.000
NBA winner (dummy)	-0.996***	-0.259	-0.989***	-0.240	0.553**	0.058
Coaching tenure at current team	0.032	0.008	0.055**	0.013	0.011	0.001
NBA player (dummy)	-0.151	-0.039	-0.052	-0.012	0.187	0.020
No playoffs (dummy)	1.026***	0.267	1.049***	0.255	0.632*	0.066
1 st round loss (dummy)	0.585**	0.152	0.524*	0.127	0.110	0.011
2 nd round loss (dummy)	0.105	0.027	-0.001	0.000	0.260	0.027
Top playoffs performance (dummy)	-	-	-	-	-	-
Constant	-1.664	-	-3.555	-	3.871	-
Pseudo R-squared	0.200		0.207		0.112	
AUC of the ROC	0.793		0.802		0.746	
Log-L	-374.645		-305.079		-159.249	
N. of observations	809		705		809	
N. of 1 in dependent	215		166		47	

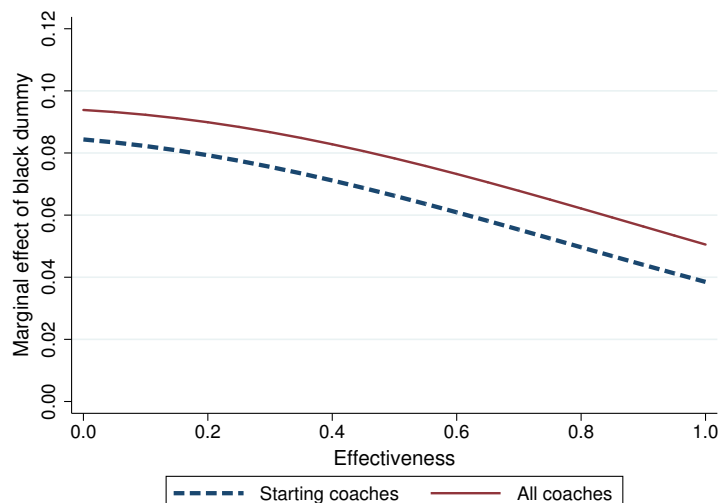
Notes: ***Significant at 1% level; **significant at 5% level; *significant at 10% level. a. In (2) Dismissal⁺, the model only includes starting coaches.
b. ME are the average marginal effects.

Table 4.6 also shows that the team winning ratio in the regular season is not a significant determinant of dismissal. A bad previous season only has a significant influence on the probability that the coach quits ($p < 0.10$). Regarding coaches' characteristics, we find that coaches who won the title in the past are less likely to be fired ($p < 0.01$) and more likely to quit ($p < 0.05$). The age of a coach decreases the probabilities of quit ($p < 0.01$), as outside options may be harsher for older coaches.

Regarding the coefficient of the main independent variable (black dummy), the analysis provides two interesting findings. First, the variable is positive and significant ($p < 0.05$ in model 1 and $p < 0.10$ in model 2), which uncovers a racial bias against black American coaches. Second, the black dummy is negative and significant ($p < 0.05$) in the model of quits (3), which demonstrates that black head coaches in the NBA are less likely to quit than their white counterparts.

The probit models show that the effectiveness of the coach in regular-season games is a consistent determinant of dismissal. Figure 4.3 displays the evolution of the marginal effect of the black dummy at different values of the variable of effectiveness. The marginal effect is always positive, but it decreases with higher values of effectiveness.

Figure 4.3: Marginal effects of the probability of dismissal for black head coaches (dependent on effectiveness)



Note: We calculate the marginal effects associated to the black dummy using the command “margins” in Stata. We obtain the average marginal effects for each increase of 0.05 in *effectiveness*.

4.4.1 Further analyses

To some extent, the independent variables can determine the influence of the black dummy. Table 4.7 provides probit estimates for the dependent variables, i.e., dismissals, dismissal with starting coaches, and quits, with two different sets of independent variables. First, the models only include the black dummy as covariate. Then, the models incorporate the rest of performance variables (*effectiveness*, *team winning ratio*, *bad previous season*, and *playoffs dummies*).

Additionally, Table 4.8 examines the influence of the two continuous variables of performance, i.e., *team winning ratio* and *effectiveness*, on the results. Table 4.8 reports the estimates of the three models including only one of the variables of performance. The results show that when we include only one of the variables, the predictive power of the model decreases, especially when the model drops the effectiveness index. This suggests an added value of the variables that consider the expectations when analyzing dismissals. Moreover, we find that the index of effectiveness has a stronger influence on the probability of dismissal.

The results in the robustness checks are consistent with the previous analysis. The performance variables have the same coefficient signs, similar marginal effects, and the levels of significance are almost the same. Most importantly for our research question, the coefficients of the black dummy are also consistent regarding the signs and the significance levels of the coefficients.

Table 4.7: Robustness checks probit regression results: black dummy

Variables	(1) Dismissal		(2) Dismissal ⁺		(3) Quit	
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
Black (dummy)	0.369***	0.215**	0.358***	0.223*	-0.281*	-0.312*
Effectiveness (0-1)		-1.047***		-1.174***		-0.553*
Team winning ratio (0-1)		-0.427		0.084		0.917
Bad previous season (dummy)		0.069		0.173		0.366**
No playoffs (dummy)		1.147***		1.180***		0.513
1 st round loss (dummy)		0.676**		0.633**		0.022
2 nd round loss (dummy)		0.170		0.086		0.241
Top playoffs performance (dummy)		-		-		-
Constant	-0.754***	-0.904**	-0.840***	-1.176**	-1.493***	-2.067***
Pseudo R-squared	0.015	0.178	0.014	0.181	0.009	0.049
AUC of the ROC	0.570	0.783	0.567	0.789	0.560	0.672
Log-L	-461.540	-384.814	-379.520	-315.078	-177.813	-170.592
N. of observations	809	809	705	705	809	809
N. of 1 in dependent	215	215	166	166	47	47

Notes: ***Significant at 1% level; **significant at 5% level; *significant at 10% level. a. In (2) Dismissal⁺, the model only includes starting coaches.

Table 4.8: Robustness checks probit regression results: performance -continuous variables

Variables	(1) Dismissal		(2) Dismissal ⁺		(3) Quit	
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
Black (dummy)	0.285**	0.252**	0.255*	0.233*	-0.339*	-0.336*
Effectiveness (0-1)	-1.212***		-1.230***		-0.324	
Team winning ratio (0-1)		-1.658***		-1.348**		-0.008
Bad previous season (dummy)	0.060	-0.027	0.128	0.030	0.324*	0.311*
Age	0.030	0.039	0.098	0.105	-0.252***	-0.250***
Squared age	0.000	0.000	-0.001	-0.001	0.003***	0.003***
NBA winner (dummy)	-0.995***	-0.933***	-0.989***	-0.928***	0.558***	0.566***
Coaching tenure at current team	0.028	0.045*	0.054**	0.064**	0.015	0.015
NBA player (dummy)	-0.156	-0.103	-0.052	-0.002	0.203	0.217
No playoffs (dummy)	1.130***	1.025***	1.060***	1.078***	0.508*	0.606*
1 st round loss (dummy)	0.625**	0.566*	0.528*	0.525*	0.059	0.074
2 nd round loss (dummy)	0.126	0.086	0.002	-0.012	0.229	0.225
Top playoffs performance (dummy)	-	-	-	-	-	-
Constant	-1.861	-1.877	-3.569	-3.774*	4.031*	3.750
Pseudo R-squared	0.200	0.176	0.207	0.178	0.111	0.108
AUC of the ROC	0.793	0.774	0.802	0.783	0.745	0.741
Log-L	-374.948	-386.188	-305.081	-316.366	-159.437	-160.029
N. of observations		809		705		809
N. of 1 in dependent		215		166		47

Notes: ***Significant at 1% level; **significant at 5% level; *significant at 10% level. a. In (2) Dismissal⁺, the model only includes starting coaches.

4.5 Discussion

Previous literature emphasizes the advantages of professional sport data to test economic issues of a broader interest in the labor market (Kahn, 2000). This paper investigates the influence of race on the dismissals of NBA head coaches over 24 years. The analysis follows recent contributions that analyze performance of sports coaches and dismissal (Humphreys et al., 2016; van Ours & van Tuijl, 2016), and calculates an index of coaching effectiveness based on expectations from betting data. The results provide the literature on racial discrimination in competitive settings with new evidence that demonstrate the role of race in dismissals.

The probit models show a significant relationship between the race of the coach and the probability of being fired. A black head coach is 7.3% more likely (6.2% if including only starting coaches) to be fired than a white coach. The rest of variables that account for coaches' characteristics, effectiveness, and performance are not able to explain this difference against black Americans. This result is unexpected. Goodall et al. (2011) show evidence that coaches who are former NBA players, and especially all-star (highly skilled) players, have better winning records in the NBA. In our sample, Table 3 shows that black coaches are more likely than white coaches to be ex-players (80% vs. 40%), and yet also more likely to be fired.

In the NBA, Hill and Remer (2018) also show evidence of a racial bias against black American head coaches both in hiring and firing. By focusing on the characteristic of the network and the race of general managers, the authors find that prior to 1998, black coaches (especially first-time hired) were fired earlier if the general manager was white. However, neither Fort et al. (2008) nor Kahn (2006) find significant differences in the probability of being fired between black and white head coaches in the NBA when controlling for efficiency.

This paper mainly differs from the above-mentioned studies in the use of a larger data set, the approach to measure coaching performance (effectiveness against expectations), and the inclusion of variables to measure post-season success. While Fort et al. (2008) use players' statistics as inputs in a stochastic frontier model to calculate the efficiency of coaches, Kahn (2006) considers actual game results and controls by team payroll to calculate efficiency and builds hazard models. Our analysis includes team winning ratio and an effectiveness index derived from betting odds, in line with Buraimo et al. (2017). Measures of performance relative to expectations are relevant when analyzing dismissals in sports (and other markets) as the public opinion has a strong influence on the decision, which is often a scapegoat

solution for owners (Tena & Forrest, 2007). Still, our analysis cannot distinguish the variations in the effectiveness index due to playing or coaching inputs.

We consider the use of betting odds to calculate the effectiveness of coaches informative in several ways. First, a weak form of efficiency characterizes this betting market, in which bookmakers are motivated to prevent losses and bettors want to make a profit. Moreover, the agents use all public information available, what ensures the access to accurate expectations on team performance (Sauer, 1998). Betting odds include implicit information regarding budgets and other variables that account for team talent. Second, the owners of teams use wins to create value to fans (Fort et al., 2008). Thus, the use of expected outcomes from betting odds, which are close to the perceptions of the public opinion (Bowman, Ashman, & Lambrinos, 2013), is beneficial to assess the effectiveness of coaches.

Market-based measures of expected results are useful for research on team leaders' dismissal. Humphreys et al. (2016) argue that these measures have the potential to assess the performance of leaders and avoid some of the biases that exist in the corporate setting. For example, CEOs use the media to manage and influence the expectations and forecasts of analysts (Farrell & Whidbee, 2003). Moreover, the limited representation of black Americans in top positions in other sectors makes professional sports a relevant setting to examine labor market discrimination.

In addition, this paper extends the contributions of Fort et al. (2008) and Kahn (2006) by including dummy variables that capture the performance of teams in the playoffs. Prior research on dismissals usually omits the performance of teams in this stage due to the increased uncertainty (the small number of games exacerbates the influence of external factors, e.g., injuries). However, we find that qualifying for playoffs is a major determinant of dismissal. Future research on coaches' dismissal should consider including effectiveness indices and proxies for playoffs performance.

In our analysis, we did not expect race to have a significant influence on the dismissal of coaches. First, the dismissal of a coach is a risky decision. Dismissals do not ensure an imminent improvement in performance as the new coach needs time to adjust to the team, and also involve additional payments and compensations (Martínez & Caudill, 2013). Second, the performance of coaches and characteristics of players in the NBA are publicly available and widely discussed. This fact should lessen the influence of racial preferences in dismissal decisions (Szymanski, 2000). Still, we find that black Americans head coaches are more likely to be fired. Arrow (1998) and Darity and Mason (1998) discuss the economic implications of a racial

bias that might still persist in the labor market through different mechanisms, e.g., limited access to the network of influence or fan preferences. Historical discrimination and negative stereotypes towards blacks are difficult to dismiss in any society after only sixty years of equality regulations. Previous contributions to the literature show evidence of racial biases in this specific competitive setting as well.

For example, Kanazawa and Funk (2001) find that fans tend to watch more local non-cable NBA games when the number of white players in the team rosters is higher. Similarly, Burdekin, Hossfeld, and Smith (2005) show that a match between the racial composition of teams and this of the market area increases home attendance. This phenomenon led the most skilled white players to areas with a larger white population during the 1990s. Moreover, in the NBA, the cartel-type behavior of teams, who do not have to face a strong penalization if underperforming, i.e., no relegation, can perpetuate racial preferences. Still, racial preferences and prejudices might be embedded in the US society and explain the biases that we observe in this setting.

The lower quit rate of black American coaches is an interesting result. A plausible cause is that black head coaches perceive racial discrimination and fewer outside options. Cunningham, Bruening, and Straub (2006) find this relationship in college basketball. An alternative explanation is that the lower quit rate of black coaches makes them more likely to “overstay” and partially explain the higher firing rate. Unfortunately, we are not able to disentangle the issue of reverse causality in this paper. Future research should consider the opportunity to examine this interrelation as multiple organizational and professional factors play a role in quit intention (Blau, 2000).

Beyond the influence of race on NBA head coaches’ dismissals, the probit results support recent findings regarding the significant relationship between teams’ expected performance and dismissals in college football (Holmes, 2011; Humphreys et al., 2016), European soccer leagues (Buraimo et al., 2017; van Ours & van Tuijl, 2016), or US firms (Engel, Hayes, & Wang, 2003). This study provides new evidence by using a market-based measure to calculate the effectiveness of coaches. Future studies can explore other alternatives to account for performance relative to expectations.

The use of odds from the betting market to create the index of effectiveness offers an opportunity for future research. This analysis is suitable to include gender as a moderator factor as women’s sports leagues register a progressive growth in

the market. The setting of sports overcome the drawbacks of studies in other industries, e.g., corporate finance. The access to detailed measures of team members' performance is limited in other industries (Farrell & Whidbee, 2003).

The implications of discriminating in highly competitive and visible settings are more relevant from an economic perspective (larger salaries and compensations). However, minor sports leagues and small enterprises can provide further insights on racial discrimination. Future research analyzing performance and dismissal in managerial positions can also include additional moderators such as the racial composition of team members and fan base.

4.6 Conclusions

The main aim of the paper is to analyze whether black head coaches suffer from discrimination in the NBA. This league is a highly competitive labor setting, where the majority of players are black. The analysis includes information from the season 1993-94 to 2016-17. First, we find that the majority of black head coaches have a professional playing career in the NBA, while the majority of white head coaches do not.

To build on this finding and further examine the differences by race, we estimate several probit models. The results show that black head coaches are more likely to be fired than white head coaches, *ceteris paribus*. The analysis controls for the performance of teams by including an effectiveness index based on expectation from betting odds, team winning ratio, and variables of performance in the late stage of the competition (playoffs). These measures report the expected results; the better the performance of teams, the lower the probability of coaches being fired. The analysis also includes other variables to control for the different characteristics of coaches regarding age, tenure, and previous success. The most relevant finding is that coaches that were successful before (NBA winners) are less likely to be dismissed and more prone to quit.

The findings of this paper contribute to extend the knowledge on the influence that race has on the dismissals of head coaches in the NBA, previously examined by Kahn (2006) and Fort et al. (2008). By including a measure of performance relative to expectations and analyzing a longer period of time, we find a racial bias against black Americans in dismissals. The bias is consistent over time and unrelated to other factors such as team performance or coach characteristics.

4.7 Appendix 1

This appendix explains in detail the calculations that are necessary to build the measure of effectiveness, as in del Corral et al. (2017). We use the specific example of LA Lakers (season 2013-2014).

Step 1. The effectiveness measure uses information from density functions, which are calculated using the probabilities of the two possible outcomes (win or loss) of each individual team extracted from betting odds. Table 4.9 shows the probabilities of outcome for the first three LA Lakers' games:

Table 4.9: Probability of outcome. 3 games

Game 1	Game 2	Game 3
LA Lakers (H) win	GS Warriors (H) win	LA Lakers (H) win
0.19	0.87	0.26
LA Clippers (A) win	LA Lakers (A) win	SA Spurs (A) win
0.81	0.13	0.74

Step 2. By multiplying the probabilities of the two possible outcomes in Games 1 and 2, we obtain the probabilities that LA Lakers achieve a given number of wins (0, 1, or 2). Table 4.10 shows these probabilities:

Table 4.10: Probability of potential wins. 2 games

Potential outcomes	Probability	Number of wins	Final probability
(1. loss, 2. loss)	$0.81 \cdot 0.87 = 0.70$	0 wins	0.70
(1. win, 2. loss)	$0.19 \cdot 0.87 = 0.17$	-	-
(1. loss, 2. win)	$0.81 \cdot 0.13 = 0.11$	1 win	$0.17 + 0.11 = 0.28$
(1. win, 2. win)	$0.19 \cdot 0.13 = 0.02$	2 wins	0.02

Step 3. To calculate the probabilities of potential wins after three games, the probabilities of win from Table 4.10 are multiplied by the probabilities of outcome in Game 3.¹⁸

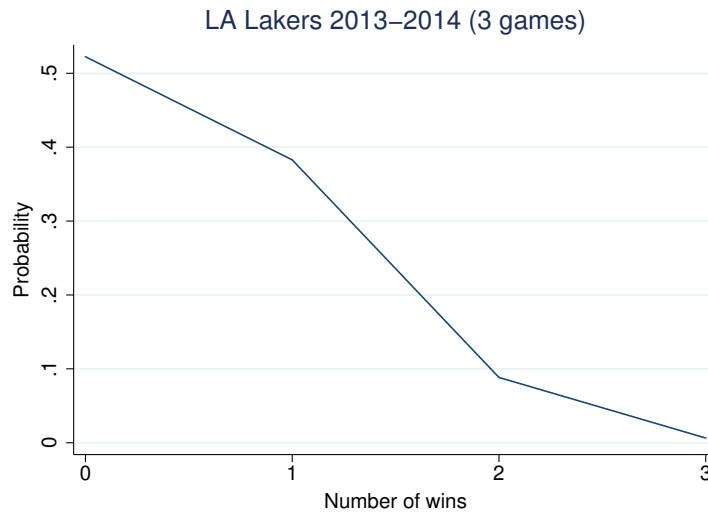
Table 4.11: Probability of potential wins. 3 games

Potential outcomes	Probability	Number of wins	Final probability
(1. loss, 2. loss, 3. loss)	$0.70 \cdot 0.74 = 0.52$	0 wins	0.52
(1. loss, 2. loss, 3. win)	$0.70 \cdot 0.26 = 0.18$	-	-
(1. loss, 2. win, 3. loss)	$0.11 \cdot 0.74 = 0.08$	-	-
(1. win, 2. loss, 3. loss)	$0.17 \cdot 0.74 = 0.12$	1 win	0.38
2-win outcomes ...	...	2 wins	0.09
(1. win, 2. win, 3. win)	$0.02 \cdot 0.26 = 0.01$	3 wins	0.01

¹⁸The final probabilities might vary due to the decimal numbers.

Step 4. Figure 4.4 charts the probabilities of the potential wins of LA Lakers after 3 games.

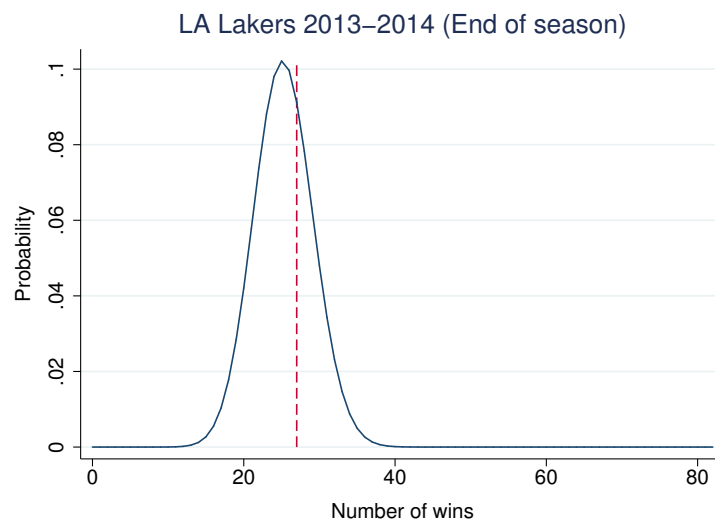
Figure 4.4: Probability of the potential wins. 3 games



Step 5. Finally, Figure 4.5 displays the probability of the potential wins for LA Lakers at the end of the season. This information is necessary to create the index of effectiveness. This index is calculated as the inverse of the probabilities of achieving more wins than the actual ones (red line in Figure 4.5) at the end of the season, and subtract the resulting number from one:

Expected wins=25; actual wins=27; effectiveness index[1 - the sum of the probability of achieving 28 to 82 wins]=0.72

Figure 4.5: Probability of the potential wins at the end of the season



4.8 Appendix 2

Tables 4.12 and 4.13 display the names of the coaches in our data set, as well as their race and number of games coached.

Table 4.12: Coaches, race, and number of games

Coach	Race	Games	Coach	Race	Games	Coach	Race	Games
Rick Adelman	White	1,428	Jeff Bzdelik	White	192	Mike Dunlap	White	82
Richie Adubato	White	33	John Calipari	White	184	Mike Dunleavy	White	1,083
Danny Ainge	White	226	Kaleb Canales	White	23	Mike Evans	Black	56
Kenny Atkinson	White	82	PJ Carlesimo	White	554	Derek Fisher	Black	136
Randy Ayers	Black	52	Rick Carlisle	White	1,214	Bill Fitch	White	328
Tony Barone	White	52	Michael L. Carr	Black	164	Cotton Fitzsimmons	White	57
Tom Barrise	White	2	John Carroll	White	36	David Fizdale	Black	82
Butch Beard	Black	164	Butch Carter	Black	165	Tim Floyd	White	321
Bill Berry	Black	2	Fred Carter	Black	82	Chris Ford	White	453
Bill Bertka	White	2	Bill Cartwright	Black	151	Lawrence Frank	White	614
Bernie Bickerstaff	Black	527	Don Casey	White	112	Mike Fratello	White	638
JB Bickerstaff	Black	71	Dwane Casey	Black	598	Alvin Gentry	Black	869
Larry Bird	White	214	Don Chaney	Black	348	Frank Hamblen	White	39
Bill Blair	White	102	Maurice Cheeks	Black	620	Leonard Hamilton	Black	82
David Blatt	White	123	Jim Clemons	Black	98	Bill Hanzlik	White	82
James Borrego	White	30	Steve Clifford	White	328	Del Harris	White	340
Jeff Bower	White	73	Doug Collins	White	603	Gar Heard	Black	44
Jim Boylan	White	106	Michael Cooper	Black	14	Bob Hill	White	316
Allan Bristow	White	246	Tyrone Corbin	Black	286	Brian Hill	White	613
Scott Brooks	White	627	Dave Cowens	White	284	Fred Hoiberg	White	164
Jim Brovelli	White	18	Michael Curry	Black	82	Lionel Hollins	Black	534
Brett Brown	White	328	Chuck Daly	White	214	Jeff Hornacek	White	295
Hubie Brown	White	168	Mike D'Antoni	White	963	Kim Hughes	White	33
Larry Brown	White	1,226	Johnny Davis	Black	219	Melvin Hunt	Black	23
Mike Brown	Black	563	Vinny del Negro	White	394	Lindsey Hunter	Black	41
Tony Brown	Black	45	Tony Dileo	White	59	Marc Iavaroni	White	123
Quinn Buckner	Black	82	Billy Donovan	White	164	George Irvine	White	106
M. Budenholzer	White	328	Larry Drew	Black	312	Dan Issel	White	306

Table 4.13: Coaches, race, and number of games (continued)

Coach	Race	Games	Coach	Race	Games	Coach	Race	Games
Mark Jackson	Black	230	Mike Montgomery	White	164	Ed Tapscott	Black	71
Phil Jackson	White	1,312	Dick Motta	White	233	Reggie Theus	White	106
Stu Jackson	Black	39	Eric Musselman	White	246	Tom Thibodeau	White	476
Chris Jent	White	18	Pete Myers	Black	3	Isiah Thomas	Black	410
David Joerger	White	328	Kenny Natt	Black	58	Jim Todd	White	37
Avery Johnson	Black	440	Don Nelson	White	1,104	Rudy Tomjanovich	White	831
Dennis Johnson	Black	24	Jim O'Brien	White	630	Jay Triano	White	229
Frank Johnson	Black	134	Kevin O'Neill	White	82	Wes Unseld	Black	82
Magic Johnson	Black	16	Randy Pfund	White	64	Jeff van Gundy	White	748
Eddie Jordan	Black	600	Rick Pitino	White	248	Stan van Gundy	White	825
George Karl	White	1,580	Greg Popovich	White	1,656	Kiki Vandeweghe	White	64
Steve Kerr	White	246	Terry Porter	Black	215	Jacque Vaughn	Black	216
Jason Kidd	Black	328	Kevin Pritchard	White	27	Sam Vincent	Black	82
Lon Kruger	White	191	Kurt Rambis	White	230	Frank Vogel	White	513
Larry Krystkowiak	White	100	Pat Riley	White	1,013	Darrell Walker	Black	169
John Kuester	White	164	Doc Rivers	Black	1,388	Luke Walton	White	82
Bob Lanier	Black	37	Flip Saunders	White	1,246	Earl Watson	Black	115
Gene Littles	Black	16	Byron Scott	Black	1,101	Bob Weiss	White	112
Kevin Loughery	White	128	Brian Shaw	Black	141	Paul Westphal	White	515
Sidney Lowe	Black	254	Paul Silas	Black	629	Lenny Wilkens	Black	869
John Loyer	White	32	Scott Skiles	White	958	Herb Williams	Black	44
John Lucas	Black	370	Jerry Sloan	White	1,416	Monty Williams	Black	394
Tyronn Lue	Black	123	Keith Smart	Black	263	Brian Winters	White	184
Jim Lynam	White	210	Quin Snyder	White	246	Randy Wittman	White	684
Nate Macmillan	Black	1,012	Erik Spoelstra	White	722	Mike Woodson	Black	680
Brendan Malone	White	100	Garry St Jean	White	368			
Michael Malone	White	270	Bob Staak	White	1			
Kevin Mchale	White	417	Brad Stevens	White	328			
Sam Mitchell	Black	427	Terry Stotts	White	693			

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Chapter 5

General discussion

5.1 Graphical approach to competitive balance

The first part of this dissertation puts the focus on the economics of sports as a unique setting, in which competitive balance is a widely studied issue. Research argues that the success of professional sports leagues in terms of fans' engagement partly depends on the ability of these organizations to preserve a fair distribution of talent among the competing teams (Pawlowski, 2013). Professional sports leagues, especially in the US, have implemented several economic regulations and policies, e.g., revenue sharing or salary caps, that have a direct impact on the competitive balance levels (Zimbalist, 2002).

Other sports leagues and international organizing bodies have also implemented economic policies that do not aim to alter the levels of competitive balance, but might generate an indirect impact. For example, the decision on the Bosman case in the European Court of Justice in 1995 was decisive for free labor mobility within the European Union (EU) and had a tremendous impact on international soccer transfers and, hence, the composition of teams. The number of foreign players substantially increased after this resolution. Flores, Forrest, and Tena (2010) anticipate a potential impact on competitive balance, analyze several European soccer leagues, and find an improvement in within-season competitive balance after the change.

More recently, in 2011, the UEFA imposed several financial regulations under the umbrella "Financial Fair Play" to ensure that teams keep a positive balance between revenues and expenses over a rolling three-year period. However, these regulations can have an indirect impact on competitive balance in domestic leagues.

Teams with older tradition and a bigger market-size will yield larger revenues, which determine the purchasing power and amount of talent of teams (Sass, 2016).

In a scenario of changes and new regulations, research needs to provide professional leagues, organizing bodies, and the rest of decision-making institutions in sports with tools to analyze short-, medium-, and long term effects. The literature on sports economics has successfully examined the influence of economic regulations on competitive balance, both theoretically (e.g., Dietl, Grossmann, & Lang, 2011) and empirically (e.g., Schmidt & Berri, 2003). However, there is still a gap for methodological advances that capture the impact of these regulations on specific competing teams and provide a complete picture of competitive balance. Chapter two contributes to two main issues.

First, some of the regulations that have an influence on competitive balance do not always affect all the competing teams; and traditional numerical outcomes do not yield all relevant information. To illustrate this point, Chapter two uses the DP rule and the expansion teams in the MLS. Regarding the DP rule, the competing teams in these leagues can choose to sign a player whose salary is above the cap or not to sign this type of player. The identification of teams that choose one of the two strategies, and the comparison of their expected and actual performance, is key to assessing the impact of the rule on competitive balance; and subsequent demand.

Similarly, when the league agrees on an expansion, a new team enters the competition for the first time. Expansion teams usually face a competitive disadvantage due to the lack of experience in the league and emotional bounds with the fan base. The graphical analysis in Chapter two (Figure 2.3) provides the league with information regarding the expected performance of DP and expansion teams and their evolution over time. This information is valuable to compare teams that embrace the regulations with these who do not, and how this relationship affects the league's competitive balance.

Second, most measures of competitive balance are numerical and provide an index of competitive balance, e.g., standard deviation of points. However, these measures cannot capture the mini-competitions, e.g., qualification for playoffs, that professional sports leagues include (Kringstad, & Gerrard, 2007). The analysis of competitive balance among teams that fight for specific prizes in these mini-competitions is relevant for the organizing bodies.

For example, the fight to enter playoffs positions in the MLS attracts the interest of most fans, as this qualification is the main goal for all the competing teams.

However, when previous research provides a numerical value of competitive balance in a season, there is not enough information to disentangle how close the fight is to enter the playoffs. This problem is even more important in the “open” European soccer leagues, which include several prizes, i.e., championship, qualification for top and second-best international competitions, or avoidance of relegation. The mini-competitions are relevant for economic analysis because they generate interest among fans, which determines demand (Kringstad & Gerrard, 2007).

Beyond the implications for research of the graphical analysis presented in Chapter two, this approach has strong managerial implications. Organizing bodies and decision-makers of professional sports leagues need a complete evaluation of the influence that certain economic regulations have on competitive balance levels. Moreover, these managerial bodies need to be aware of the strengths and weaknesses of the leagues in terms of competitive balance (and the patterns traceable over time) to maximize fan attention and coverage benefits.

Teams’ managers can benefit from a combination of methods of competitive balance that include a graphical analysis. The presented method in Chapter two offers the possibility to identify specific teams in the global picture of the competition. This information is important for teams to compare themselves with the rest of contestants, as they need to decide the strategies to maximize performance and demand, e.g., actual impact of designated players on teams’ expected results (Locker, 2018).

Figure 2.5 in the appendix of Chapter two shows the example of two teams that enter the competition the same year as a result of an expansion, i.e., Toronto and Vancouver, and report a very different evolution. The graphical analysis allows these teams to know their expected role in the competition in comparison with the rest of teams (and their strategies) over time, which is essential to develop a medium- and long-term planning.

To create the graphical analysis, Chapter two relies on the use of betting data. This is relevant to the analysis of competitive balance because of two main reasons. First, the literature on sports economics agrees that betting odds are a relevant source to predict team performance. This is due to the characteristics of the market and the need of bookmakers and bettors to make a profit anticipating the outcome of the events (Franck, Verbeek, & Nüesch, 2010). Some studies incorporate these ex-ante indicators to analyze competitive balance (e.g., Bowman, Lambrinos, & Ashman, 2018; McEwen & Metz, 2016).

Second, the measures of expected performance, which are ex-ante, are linked to demand. This is important to analyze competitive balance. When fans make the decision whether to watch a sports event on TV or to go to the stadium, they do it according to expectations on teams' talent. It does not matter if fans prefer the local team to win or to watch an exciting game, they make the decision based on ex-ante information.

Thus, prospective measures of competitive balance that use probabilities of win and capture a priori differences in team talent are important. Economic regulations that aim to preserve the levels of competitive balance need to consider the expected difference in team talent and disregard the noise of the competition (injuries, sanctions, and referee decisions) that is embedded in the final results.

Apart from the methodological advantages and managerial implications, the graphical analysis of competitive balance proposed in Chapter two has some limitations. This method cannot yield statistically significant results as the analysis is primarily qualitative. Future research can improve this method by incorporating a statistical measure that, for example, capture the extent of the separation or tightness among the distributions. This is especially important to assess the significant impact of economic regulations on competitive balance over time in different leagues.

Another possibility for future research is to examine the evolution of competitive balance in women's soccer. This is a growing setting, which is implementing changes and increasing media and fan attention in Europe (Gomez, 2019). Future work can use betting odds to trace changes in competitive balance over time and its impact on demand in women's domestic leagues. Valenti, Scelles, and Morrow (2019) explore this idea in international competitions. Moreover, the graphical analysis provides teams with information regarding the expected results of contestants, who might use specific strategies regarding talent management for organizational change.

5.2 Minorities in influential labor positions

5.2.1 The case of women head coaches

The representation of women in leadership roles is a priority in the international agenda, especially in fields in which the number of women is comparably low, e.g., STEM. Research in labor economics and management examine the relationship between gender diversity and performance in organizations and find inconsistent results

(Kulik & Metz, 2017). A major concern is the difficulty to find indicators of performance, beyond organizational outcomes, that capture the managerial influence of the leaders.

Chapter three performs an empirical analysis in the sports setting. In sports, men occupy the majority of influential positions; however, a considerable number of female coaches manage elite teams in women's competitions. Darvin, Pegoraro, and Berri (2018) identify three potential causes of this gender asymmetry in coaching positions, i.e., lower supply, discrimination within the field, and lower performance. The chapter examines the performance of men and women head coaches in professional women's soccer across three top European leagues.

The main finding demonstrates that the gender of the coach is not a significant determinant of team performance. This evidence disregards the notion that nature, i.e., cognitive ability and personality traits, determines the ability of men and women to perform certain tasks. This result opens room for the discussion of the influence that the social context has on the gender differences that we observe in the labor market (Fine, 2010).

In male dominated fields, women face a stereotype that questions their professional competence as a result of men's privileged access to knowledge and practice over the years (Spencer, Steele, & Quinn, 1999). This stereotype has the power to bias the evaluation of women's performance and restrict the access to managerial positions (Heilman, 2001), especially in these fields in which objective measures are not available.

In sports, several studies find that women coaches report experiences of being undervalued and marginalized through structural practices, which result in self-limitation behaviours, determining performance and career choices (Norman, 2010). This sort of experiences start early in the career of women coaches, even before they get the licence to become a coach. Lewis, Roberts, and Andrews (2018) report several examples of inappropriate practices of coach educators and male peers against women in the coach education system in the UK. The authors summarize self-reported disrespectful conducts and language that create an intimidating and degrading atmosphere for women.

Once inside the labor market, women coaches still feel discriminated and undervalued. Women perceive a discriminatory treatment that undermines the efforts to advance in the coaching career and have a negative influence on performance (Norman, 2014). In college sports in the US, Gurney, Lopiano, and Zimbalist (2017)

find that coaches perceive better working opportunities for men. For instance, the majority of current coaches believe that it is easier for men to get to top coaching positions (65%), to negotiate salary increases (75%), and to be promoted or achieve multiyear contracts (52%).

Moreover, Gurney et al. (2017) find self-reported evidence that women and men have different working conditions at their current positions. For example, approximately 50% of women coaches report being paid less for doing the same job as other coaches, while only 27% of men coaches do. In addition, women are twice as likely to believe that their performance evaluation is different due to gender, and more likely to report being called to perform tasks not included in the job description (46% vs. 36%).

The gender stereotypes against the competence of women coaches in the sports workplace can act as a self-fulfilling prophecy mechanism. Darity and Mason (1998) discuss that if employers believe that members from group A are more productive, they will hire them more often and will be keen to provide positive evaluations. Then, members from group B will become less interested in the job and less motivated. Thus, irrational decisions (regarding actual performance) can negatively affect the performance of women coaches, discourage their effort, and drive them out of the market.

This mechanism is associated with the stereotype threat and the “knowing-and-being effect”¹, which is present in male-dominated fields and can trigger negative emotions such as anxiety (Fine, 2010). In mathematics, an argument to justify the underrepresentation of women in math-related fields is based on gender differences in tests scores. However, Niederle and Vesterlund (2010) discuss how stereotypes on confidence and competition can influence these scores. Studies find women to perform worse in tasks when they are presented as “male-favourable”, e.g., a math test in which before the start women are told that they usually obtain lower scores (Cadinu, Maass, Rosabianca, & Kiesner, 2005).

Despite the number of stereotypes that women coaches face in sports, this dissertation finds no evidence that female coaches underperform in comparison with their male counterparts. Therefore, performance differences cannot be used to justify the underrepresentation of coaches. In fact, women coaches overcome the prejudices and manage to perform under the pressure of failing and reinforce the stereotype (Spencer et al., 1999).

¹ “*I know women are not very good at coaching and I am a woman.*”

The lack of differences in team performance by gender have implications for research in group diversity to which Chapter three entrusts the theoretical framework. The results do not support social categorization and similarity attraction theories. Previous studies suggest that female team members have a preference for similar others in coaching positions (e.g., Fasting & Pfister, 2000). However, this preference is not enough to trigger a salience that affects team performance in the analyzed leagues.

This evidence suggests that the gender of the leader is not a significant determinant of performance, even when all the team members belong to the same gender group. However, there is no evidence that this relationship persists when the team members are men and the leader a woman. Future research needs to test this hypothesis regarding the performance of male-dominated groups and women leaders in other fields. Very few women coach men's teams in professional sports.

In corporate finance, previous research examines the performance of firms with women in CEO and senior management positions; and finds a positive relationship (e.g., Dezsö & Ross, 2012), no systematic differences (e.g., Wolfers, 2006), but overall mixed results (Post & Byron, 2015). Micro-data on the performance of small companies/teams, in charge of projects with measurable outcomes, can help to shed light on this issue.

Chapter three's finding rules out the possibility that women are underrepresented in coaching positions in European soccer because they underperform. However, there is an important gap to understand the causes of underrepresentation of women coaches related to supply inequality and labor discrimination (Darvin et al., 2018). Unfortunately, the type of data available in this study does not allow an empirical examination of these issues. Future research needs to consider the possibility of using other methods, e.g., field experiments, to analyze biases in the hiring process and contracts' conditions. In addition, research requires a qualitative approach to understand preferences of female and male athletes regarding coaching careers.

Finally, the results have a limitation regarding the influence that other attributes, such as race and nationality, have on the underrepresentation of women coaches. In Chapter three's sample, the vast majority of coaches are white and most clubs employ national coaches. Therefore, the data do not have enough variability to allow for a sensible analysis that captures the influence of race and nationality.

Still, previous research discusses that gender discrimination is harsher for women from racial minorities. For instance, Carnevale, Smith, and Gulish (2018) find racial

disparities against black women underneath the wage gender gap in the US that other variables, such as educational attainment, cannot explain. In sports, women from racial minority groups are particularly underrepresented in coaching positions (Norman, 2010). Therefore, future work needs to perform empirical analyses of coaching performance in a setting with greater racial diversity, e.g., women's sports leagues in the US.

5.2.2 The case of black head coaches

Similar to the gender issue, the representation of individuals from racial minorities in the labor market is a major concern for today's societies. The case of black Americans in the US has a special relevance due to its magnitude and history. The problem of underrepresentation is aggravated in influential positions of certain sectors, e.g., CEO positions in big companies, and limits the possibility to perform empirical analyses to examine discriminatory practices (Frick, 2018). This dissertation uses professional basketball in the US to compare the labor conditions of black and white Americans and find significant differences.

Chapter four calculates the effectiveness of coaches to analyze the influence of racial preferences on dismissals in the NBA. This highly competitive labor setting employs a significant number of head coaches from a racial minority and, therefore, allows the analysis to test hypotheses of labor discrimination. Moreover, this competition is one of the most influential in the world; with international TV coverage and billions of revenue. In such a setting, the adverse economic effect of maintaining a taste for discrimination is especially detrimental.

Traditional assumptions hold that competitive markets will eliminate discrimination, as it reduces the productivity of organizations and their ability to be competitive (Becker, 1957). However, there is a substantial residue of discrimination that remains in today's societies. The case of racial biases and discrimination in the US is substantial due to the short period of action of equality regulations. Activist movements and organizations working for the rights of black Americans denounce the so called "color line" that is rooted in history and still prevents this minority to be fully integrated in a wide range of America's social domains (Pager & Shepherd, 2008).

Recent research finds signs of this discrimination against black Americans in the access to the sharing economy, e.g., accommodation (Edelman, Luca, & Svirsky,

2017), transportation (Ge, Knittel, MacKenzie, & Zoepf, 2016), or the labor market, e.g., sales, administrative support, clerical, and customer services in Boston and Chicago (Bertrand & Mullainathan, 2004) and further jobs related to the low-wage market in New York City (Pager, Bonikowski, & Western, 2009).

Therefore, the literature anticipates that black Americans have a disadvantage to enter the labor market. This challenges the traditional assumptions of the capacity of markets to eradicate discriminatory behaviours. Arrow (1998) and Darity and Mason (1998) argue that one of the main causes of this inefficiency of the markets is the impossibility to find accurate measures of productivity. In most industries, it is impossible to find objective performance outcomes that can serve to evaluate the work of employees.

In such a context, professional sports leagues opens a window of opportunity to empirically analyze racial discrimination (Simmons & Berri, 2019). Professional basketball is appropriate as it is highly competitive, includes black Americans in top decision-making positions, has a large market for players and coaches, and reports detailed measures of performance. Moreover, the financial resources of teams are usually available to the public (Szymanski, 2000) and the decisions of coaches and managers are visible and discussed worldwide. These elements should contribute to eradicate the influence of racial preferences.

Previous research finds unlike results. While Hill and Remer (2019) find that race has played a significant negative role in employment outcomes (and dismissals) of black American coaches during the last decades, Fort, Lee, and Berri (2008) and Kahn (2006) do not provide evidence that this discrimination persists in dismissal decisions after controlling for the efficiency of coaches.

However, by using a new measure to approach the effectiveness of coaches based on betting odds, Chapter four finds that black American coaches are about 7.3% more likely to be fired. This racial bias is consistent at all levels of effectiveness, which does not support the findings of Fort et al. (2008) and Kahn (2006), and is unrelated to other factors such as age, previous experience, or results. Different methods to calculate the performance of coaches seem to lead to different results. Future studies need to approach this methodological challenge by assessing the advantages and limitations of the different alternatives.

The findings in Chapter four show the existence of a racial bias that is embedded in a competitive labor setting. Identifying biases against minority groups is an important step to eradicate such behaviours. Pope, Price, and Wolfers (2018) show

how awareness of even subtle biases results in a significant change of behaviour. After the widespread media attention that the results of Price and Wolfers (2010) identifying a racial bias among NBA referees received, Pope et al. (2018) demonstrate that this bias disappeared after the media coverage.

The previous chapters have discussed the advantages of using betting odds for research in sports economics. The fact that the odds reveal perceptions on expected performance, which are closer to the public opinion (Bowman et al., 2018), is interesting for the analysis of discrimination on dismissals. The decision to fire a leader or coach is often a scapegoat solution for owners and managers that need to appease dissatisfied share-holders and fans (Tena & Forrest, 2007). However, some attributes of coaches from minority groups, e.g., race or nationality, can exacerbate this effect.

The available data set in Chapter four is limited regarding the variability in nationalities among NBA head coaches. However, research shows that nationality often determines labor opportunities (e.g., Kaas & Manger, 2012). In sports, Berri, Deutscher, and Galletti (2015) provide evidence that basketball players born in the USA receive a favourable treatment regarding minutes played (controlling for performance) both in the US and Spain. Therefore, future studies should consider other sports leagues to examine this influence.

The results of the chapter support the notion of an inherited racial bias against black Americans that not only hinders the access to the market (e.g., Bertrand & Mullainathan, 2004), but also worsens labor conditions in competitive settings. The results go against the argument that competitive markets would eliminate discrimination (Becker, 1957). One possible explanation is that the structure of the NBA -cartel type behaviour with no big penalization for bad performance (no relegation)- allows teams to keep a taste for discrimination.

Hill and Remer (2019) show that employment history also plays a role. First-time hired coaches partly explain the observed racial difference in the firing rate. Other factors are related to the racial composition of the fan base (Burdekin, Hossfeld, & Smith, 2005), which has historically influenced salaries (Hamilton, 1997) and demand (Kanazawa & Funk, 2001). Moreover, previous studies find that racial biases have a determining influence on other behaviours in the NBA, e.g., race of referees and players on games' misconducts (Price & Wolfers, 2010).

Unfortunately, this dissertation cannot further explore these determinants with the available data set. Future research should consider if the dismissals of coaches by race are correlated with the racial composition of the potential fan base population.

Similarly, future studies can also incorporate the influence of the political preferences of the population, as they often embed biases against “outside” individuals from minorities (Semyonov, Raijman, & Gorodzeisky, 2006).

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Chapter 6

Conclusions

This dissertation uses the professional sports context to perform applied economic analyses with a twofold purpose.

First, the dissertation contributes to further develop the analysis of competitive balance, which is a major topic in the sports economics literature. Chapter two puts the focus on the implementation of a graphical method that is based on prospective data extracted from betting odds. The analysis uses the MLS in the US to highlight the methodological advantages of the graphical approach: (1) uncovering the expected performance of teams that determine the global levels of competitive balance; (2) analyzing the competitive balance of mini-competitions within a league, e.g., playoff qualification; and (3) using the expected performance of teams to assess the influence of economic regulations, e.g., expansion policies. The chapter also discusses the implications of this sort of analysis for the managerial tasks of organizing bodies and teams' representatives, and the limitations of not reporting statistical significance.

Second, the dissertation uses sports data to analyze gender- and race-related issues, and contributes to the literature on labor economics and management. Chapter three compares the performance of men and women coaches in European women's soccer leagues in France, Germany, and Norway during the period 2004–2017. The results show that the gender of the coach is not a significant determinant of team performance, and therefore, refute the idea that women are less valid to lead a team. The argument of different psychological traits by gender is often used to explain the underrepresentation of women in managerial positions of influential sectors. Moreover, the analysis shows interesting results for sports economists regarding the insignificant influence that previous playing experience has on coaching performance.

Chapter four examines racial labor discrimination and focuses on dismissals decisions in top managerial positions. The analysis includes an effectiveness index, based on expectations from betting market data, as a primary moderator factor. To this purpose, the paper estimates several probit models that analyze the exits of head coaches in the NBA, both dismissals and quits, over a 20-year period. The main result shows that black coaches are more likely to be fired, which contrasts with previous findings in this specific league. However, the results of the chapter are in line with other set of studies that report racial biases against black Americans in sports and other social domains in the US.

Chapter 7

Conclusiones

Esta tesis utiliza el deporte profesional para realizar un análisis económico aplicado con un doble objetivo.

Primero, la tesis contribuye a desarrollar el análisis de balance competitivo, que es un elemento diferencial en la economía del deporte. El Capítulo dos se centra en la implementación de un método de análisis gráfico, basado en datos prospectivos extraídos de apuestas deportivas. El análisis utiliza la MLS en Estados Unidos para presentar las ventajas metodológicas del método gráfico: (1) muestra el rendimiento esperado de los equipos, que determina el nivel global de balance competitivo; (2) analiza el balance competitivo de las mini-competiciones dentro de una temporada, e.g., clasificación para *playoffs*; (3) utiliza el rendimiento esperado de los equipos para evaluar la influencia de regulaciones económicas, e.g., políticas de expansión. El capítulo también menciona las implicaciones de este tipo de análisis para los responsables de las tareas de gestión de los equipos y las limitaciones de no incorporar la significancia estadística.

Segundo, la tesis utiliza datos de deporte para analizar cuestiones de género y raza; y contribuye a la literatura de gestión y economía laboral. El Capítulo tres compara el rendimiento de entrenadores y entrenadoras en tres ligas de fútbol femenino europeas (Alemania, Francia y Noruega) entre los años 2004 y 2017. Los resultados muestran que el género del entrenador no es un determinante significativo del rendimiento del equipo y, por tanto, contradicen el argumento de que las mujeres son menos válidas para liderar un equipo. El argumento de diferencias de género en rasgos de personalidad es utilizado a menudo para explicar la infrarrepresentación de mujeres en puestos de gestión en sectores de influencia. Además, el análisis muestra resultados relevantes para economistas y gestores del deporte en relación con la

insignificante influencia que tiene la experiencia como jugador para el rendimiento de los entrenadores.

El Capítulo cuatro analiza la discriminación por raza en el contexto laboral y se centra en los despedidos en puestos relevantes de gestión. El análisis incluye un índice de efectividad, basado en datos del mercado de apuestas, como factor principal. En el artículo se estiman varios modelos probit que examinan las salidas, despidos y renuncias, de los entrenadores de la NBA durante más de 20 años. El resultado principal muestra que los entrenadores negros tienen más probabilidad de ser despedidos, lo que contrasta con estudios previos que no encuentran diferencias por raza en esta competición. Sin embargo, esta tesis confirma la existencia de un sesgo contra los americanos de raza negra que, también, ha sido hallado en otros dominios deportivos y sociales en Estados Unidos.

