

**12th ESEA Conference on Sport Economics –
Online Conference hosted by Bielefeld University
(Germany)**

25 – 27 August 2021

BOOK OF ABSTRACTS

Local Organizers:

Prof. Dr. Pamela Wicker & Prof. Dr. Christian Deutscher



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Preface by the ESEA President

Dear Colleagues,

The most important activity of the European Sport Economics Association (ESEA) is the organization of its yearly conference. Over time, it has grown to an event where many sports economists, young and old, senior and junior, have met. Papers have benefitted from comments, and the workshop for PhD students has shown its value. For reasons well-known, the 2020 conference had to be cancelled. I am very happy that this year's conference will take place online, and that we will continue with live conferences as of 2022. Organization of the conference is done by local organizers, and I want to express a big thank you to the local organizers of this year's conference, Christian Deutscher and Pamela Wicker from Bielefeld University, Germany, but also to the organizers of future ESEA conferences who have had to postpone organization of their conference.

I am very much looking forward to this online conference. The program offers a blend of theoretical and empirical research, with focus both on elite sports and community sports. The program shows the vitality of our field.

I hope that this conference will give you new ideas and inspiration. I am looking forward to meeting you online!



Prof. Dr. Ruud H. Koning, University of Groningen
President, European Sport Economics Association

Preface by the Local Organizers

Dear Conference Participants,

We are delighted to welcome you to the 12th Annual Meeting of the European Sport Economics Association (ESEA). The Department of Sports Science from Bielefeld University in Germany is the proud host of the online conference held from 25 – 27 August 2021, preceded by a PhD workshop from 23 – 24 August 2021.

We welcome speakers from Australia, Austria, Belgium, Canada, Denmark, England, Finland, Germany, Ireland, Poland, Netherlands, Norway, Russia, Spain, Switzerland, and the United States of America. The conference is opened by a keynote by Prof. Dr. Bernd Frick from the University of Paderborn, Germany, and continues with 20 parallel sessions. Zoom sessions serve as virtual rooms for the presentations. Since its inaugural conference in Paris in 2009, this is the first time that the ESEA Conference will be held online only. In February 2021, the decision was made to move to a virtual format as a result of the ongoing challenges and travel restrictions associated with the COVID-19 pandemic. As members of the ESEA Board, we stepped in and organized this conference on short notice. We would like to thank the organizers of the next ESEA Conferences for their flexibility and look forward to seeing everybody again in person in the next years.

The present Book of Abstracts contains 60 contributions from academics and covers a wide range of topics from the field of sport economics, including gender economics, the demand for sports, sport participation, careers, managers and coaches, and performance in sports. A special issue of the *International Journal of Sport Finance*, the official ESEA journal, is dedicated to publishing selected papers from this conference.

We would like to thank all members of the scientific committee who assisted in reviewing the submitted abstracts. We also thank the organizer (Dr. Katrin Scharfenkamp) and the speakers of the PhD workshop (Prof. Dennis Coates, Assoc. Prof. Brian Soebbing, Dr. Petr Parshakov) for their dedication and commitment to developing young scholars in sports economics.

We hope you will enjoy the 12th ESEA Conference.

Yours sincerely,

The Local Organizers



Prof. Dr. Christian Deutscher & Prof. Dr. Pamela Wicker
Bielefeld University

Scientific Committee

The Scientific Committee consists of Local Organizers (LO), ESEA Board Members (ESEA), and Board Members of the North American Association of Sports Economists (NAASE):

Prof. Dr. Nola Agha, University of San Francisco (NAASE)

Prof. Dr. Craig Depken, University of North Carolina at Charlotte (NAASE)

Prof. Dr. Christian Deutscher, Bielefeld University (LO, ESEA)

Prof. Dr. Arne Feddersen, Southern Denmark University (ESEA)

Svenja Feiler M.Sc., German Sport University Cologne (ESEA)

Prof. Dr. Brad Humphreys, West Virginia University (NAASE)

Prof. Dr. Ruud Koning, University of Groningen (ESEA)

Prof. Dr. Eva Marikova Leeds, Moravian College (NAASE)

Dr. Marius Ötting, Bielefeld University (LO)

Prof. Dr. Jane Ruseski, West Virginia University (NAASE)

Dr. Katrin Scharfenkamp, University of Duisburg-Essen (ESEA)

Dr. Sandra Schneemann, Bielefeld University (LO)

Prof. Dr. John Solow, University of Iowa (NAASE)

Prof. Dr. Frank Stephenson, Berry College (NAASE)

Prof. Dr. Pamela Wicker, Bielefeld University (LO, ESEA)

PhD Workshop

To provide graduate students a forum to connect with each other, but also improve their knowledge about sports economics as well as their econometric skills, ESEA's Annual Conference is preceded by a PhD Workshop. This year's edition is organized by Katrin Scharfenkamp in her role as ESEA Youth Development Officer. Altogether, 13 international graduate students registered for this year's workshop.

The lecturers of the PhD Workshop were Dennis Coates (UMBC), Petr Parshakov (HSE University), and Brian Soebbing (University of Alberta). The workshop included sessions on the basics of academic writing and the review process as well as the basics of web scraping and estimating difference-in-differences models.

The ESEA Board thanks Dennis Coates, Petr Parshakov, and Brian Soebbing for providing an interesting workshop with a variety of topics and sharing their academic insights with our next generation of sports economists.



Dr. Katrin Scharfenkamp, University of Duisburg-Essen
ESEA Youth Development Officer

Best Young Researcher Paper Award (BYRPA)

Since 2014 the European Sport Economics Association (ESEA) awards graduate students whose papers are of high quality, originality, and clarity. The objective of the Best Young Researcher Paper Award (BYRPA) is to promote excellence in research conducted by young prospect researchers in the field of sports economics. The award includes an official certificate and a small honorarium.

In 2021, the BYRPA was organized by ESEA's Youth Development Officer Katrin Scharfenkamp. The award committee consisted of Alex Krumer (Molde University College, Norway) and Georgios Nalbantis (University of Tuebingen, Germany).

Sam Hoey (Erasmus School of Economics, Rotterdam, Netherlands) is this year's winner of the Best Young Researcher Paper Award. He won the award for the paper entitled 'One Man's Pain is Another Man's Gain – Early Career Exposure and Later Labour Market Outcomes'. The ESEA Board congratulates Sam Hoey for this achievement and wishes him all the best for his academic career in sports economics.



Sam Hoey, PhD Candidate

Erasmus School of Economics (Rotterdam)

2020 Peter Sloane Award

Peter J. Sloane is the first economist in Europe to publish on the economics of team sports. He published a classic contribution in 1971 in the *Scottish Journal of Political Economy*, where he extended models assuming profit maximization to the case where winning is an explicit objective of a team.

The Peter Sloane Award (PSA) was established by the ESEA Board in 2019 and is presented biannually. It is given based on the following criteria:

- Research contribution to European sports economics,
- Development of young scholars in sports economics,
- Service to the development of the European sports economics community

The first PSA should have been awarded at the 2020 ESEA Conference, which was, however, cancelled because of the COVID-19 pandemic. Therefore, the 2020 PSA is awarded at this year's conference. The Award Committee consisted of Prof. Dr. Rob Simmons (Lancaster University; Chair), Dr. Ute Schüttoff (University of Tübingen), and Assoc. Prof. Dr. Thomas Peeters (Erasmus University Rotterdam).

The 2020 PSA is awarded to **Stefan Kesenne** for his achievements and outstanding contribution to the European sports economics community. Unfortunately, Stefan Kesenne passed away in June 2021. This passing was received with great sadness by the ESEA Board and the ESEA Community.



Prof. Dr. Stefan Kesenne
University of Antwerp

Program of the 12th ESEA Conference on Sport Economics

Time (CEST)	Wednesday, 25 August 2021		
	Zoom Room 1	Zoom Room 2	Zoom Room 3
15:00	Welcome ESEA President and Local Organizers Opening Keynote: Bernd Frick Sports Economics: Past Lessons and Future Directions		
16:30	Break		
	Session I: Gender Economics Chair: Dave Berri	Session II: Environmental Economics & Discrimination Chair: Iuliia Naidenova	Session III: Betting & Voting Chair: Oliver Budzinski
17:00	Coates, Webber: Productivity in Women's Football	Naidenova, Parshakov, Suvorov: Air Pollution and Individual Productivity: Evidence from the Ironman Triathlon Results	Merz, Flepp, Franck: Underestimating randomness: Outcome bias in betting exchange markets
17:30	Walker, Allred, Berri: Could More Dunking Help the WNBA?	Maennig, Mueller: Consumer and employer discrimination in Major League Baseball – New evidence on the cost of discrimination	Ötting, Michels, Langrock, Deutscher: Patterns of betting behaviour for news in live betting markets
18:00	Lackner, Weichselbaumer: The causal effect of past on present performance for women and men - Evidence from top-level Tennis		Budzinski, Gaenssle, Kunz-Kaltenhäuser: Differences in Jury Voting, Peer Voting, and Fan Voting - Analyzing the NFL's All-Pro and Pro-Bowl Voting Outcomes
18:30	Break		
	Session IV: Sport Participation Chair: Paul Downward	Session V: Bias Chair: Brad Humphreys	Session VI: Sport Finance Chair: Seppo Suominen
19:00	Downward: Youth Sport and Mental Health: Can sport contribute to solving the mental health crisis?	Humphreys, Marsella, Pérez: The effect of crowds on petty-crime law enforcement: A natural experiment from European football leagues	Ratz, Pfeffel: Supporter Crowdfunding –The Implicit Role of Fan Loyalty and Trust
19:30	de Boer, Mierau, Koning: Deconstructing the health benefits of sport participation: how are the amount, intensity and type of sport participation associated with socioeconomic differences in obesity, diabetes and all-cause mortality?	Faltings, Krumer, Lechner: Rot-Jaune-Verde. Language and Favoritism: Evidence from Swiss Soccer	Suominen: Sport and cultural events: willingness to pay, facial expressions and skin response
20:00	Boller, Lechner, Okasa: The Effect of Sport in Online Dating: Evidence from Causal Machine Learning	Veldkamp, Koning: The impact of the video assistant referee (VAR) at the conversion rates of penalty kicks in the highest leagues of professional football.	Thormann, Gehrman, Wicker: The monetary value of sport participation and volunteering: The wellbeing valuation approach
20:30 – 21:00	Best Young Researcher Paper Award (BYRPA)		

Thursday, 26 August 2021			
Time (CEST)	Zoom Room 1	Zoom Room 2	Zoom Room 3
	Session VII: Performance I Chair: Brian Soebbing	Session VIII: Demand I Chair: Nicholas Watanabe	Session IX: Careers I Chair: Dennis Coates
15:00	Huang, Soebbing: Dispersion in (UN)Explained Pay and On-Field Team Performance: The Case of Italian Serie A	Watanabe, Xue, Yan, Newman: Demand for Esports: An Econometric Analysis of the Digital Sport Economy	Grey, Booth, Brooks: The Golden Age in Rowing: Has the Age of Peak Performance Changed?
15:30	Frick, Simmons: Into Thin Air: Team Composition and Team Performance in Himalayan Expeditions, 1990-2019	Mueller: Fan loyalty and uncertainty-of-outcome preferences: New evidence from Major League Baseball	Butler, Coates: The Impact of Position on Salary Determination: Evidence from Major League Soccer
16:00	Bühren, Gabriel: Performing best when it matters the most: Evidence from professional handball	Naidenova, Parshakov: Broadcasts vs. highlights: What does a modern consumer prefer?	Böheim, Grübl, Lackner: Salary and delinquent conduct in the NBA
16:30	Break		
	Session X: Managers & Coaches Chair: Sören Dallmeyer	Session XI: Competition Chair: Hendrik Sonnabend	IJSF Editor's Report and Farewell
17:00	Dietl, Lang, Orłowski, Wegelin: To go or having to go: Effects of voluntary vs. involuntary job changes on subsequent performance	Mao: Survival of the fittest: Experience quality, market demographics, and competition	
17:30	Nasser: Manager's Contribution to Team's Performance: The Egyptian Premier Football League	Skrok, Lubasiński: Subsidy competition in professional football in Europe: a case of a CEE country	
18:00	Dallmeyer, Orłowski: The ultimate scapegoat: COVID-19 and managerial turnover	Sonnabend, Reicherseder: When colleagues come to see each other as rivals: Does internal competition affect workplace performance? Evidence from European soccer	
18:30	Break		
	Session XII: Performance II Chair: Michael Leeds	Session XIII: Careers II Chair: Rob Simmons	Session XIV: COVID Chair: Themis Kokolakis
19:00	Olsen, Leeds: Adapt or Die? Integration and Team Performance in the NBA	Berri, Rossi, Simmons, Tordoff: Is the labour market for goalkeepers efficient?	Kokolakis: Evaluation of the economic impact of COVID-19 on the UK sport economic sector in 2020
19:30	Peeters, van Ours: International Assortative Matching	Hoey: The effect of early career exposure to employers on future career outcomes: Evidence from the National Hockey League	Fischer: Thinning out Spectators: Did Football Matches Contribute to the Second COVID-19 Wave in Germany?
20:00		Metelski: League Level as a Factor of an Athlete's Second Professional Career	
20:30 – 21:00	Peter Sloane Award (PSA) Ceremony		

Time (CEST)	Friday, 27 August 2021		
	Zoom Room 1	Zoom Room 2	Zoom Room 3
	Session XV: Players Chair: Rodney Paul	Session XVI: Performance under Pressure Chair: Arne Feddersen	Session XVII: Demand II Chair: Georgios Nalbantis
15:00	Southwick, de Jong, Berri: Is There a Loser's Curse in the NBA?	Feddersen: Is Being Slightly Behind at Halftime Good? Loss Aversion and Diminishing Sensitivity in Professional Team Sports	Barajas, Gasparetto: Factors attracting fans to different standings in the stadium: Evidence from Disaggregated Data
15:30	Paul, DiMaria: Nepotism in the NHL? An Analysis of the Draft, Games Played, and Salaries	Lackner, Sonnabend: Presenteeism when employers are under pressure: evidence from professional soccer	Reichel, Brandt, Kurscheidt: Why Are They Interested in Watching Professional Handball? – Survey Findings On German Handball Attendance
16:00	Madden: A sports league model based on assignment of heterogeneously talented players to team rosters where roster talent and size matter	Steinfeldt, Dallmeyer, Breuer: What's the point? The effect of social pressure on shirking in the face of adversity	Otto, Nalbantis, Pawlowski: Political Relations and Sports: Exploring the Demand for Relocated Soccer Games
16:30	Break		
	Session XVIII: Contest Organization I Chair: Carlos Varela-Quintana	Session XIX: Demand III Chair: Stacey Brook	Session XX: Contest Organization II Chair: Angel Barajas
17:00	Masia, Tena, Varela-Quintana: Spatial concentration in intermediate products. Evidence from the soccer industry using a REWB model	Brook: General Admission Alcohol Availability at American College Football Bowl Subdivision Stadiums: A Difference-in-Difference with Timing Variation Analysis of Ticket Sales and Concession Revenues	Müller: Stop the thieves - how can a handful of top clubs plough up the entire football landscape almost unnoticed and without any significant resistance?
17:30	Dagaev: Monsters are not Real! Critique of Artificial Players Concept in the Bradley-Terry Framework	Hogan, Massey: Behind Closed Doors: Impact of Zero Attendances on Home Advantage in Pro14 Rugby	Ugrumov, Barajas: The impact of innovations on the competitive balance in the Kontinental Hockey League
18:00	Baldin, Marchenko, Sonnabend: Small fish in a big pond or big fish in a small pond? Tournament entry decisions in professional tennis	Nalbantis, Pawlowski: Exploring the Causal Effects of Marketing Events: An Application to Exhibition Games in Football	Galdino, Wicker: An unrealistic competitive schedule? Football club locations, travel, and lack of rest in Brazil
18:30	Break		
19:00	AGM		
20:30 – 21:00	Closing of Conference		

All sessions: 20 minutes for presentation, 10 minutes for discussion. Session chairs act as timekeepers and facilitate the discussion.

Opening Keynote

Sports Economics: Past Lessons and Future Directions

Sports economics – defined as the application of labor and industrial organization principles to sports issues – is a rapidly growing sub-discipline in economics with a number of field journals. Moreover, sports economists have successfully made their way into general economics journals. Contrary to other fields like e.g. personnel economics most of the work in sports economics has been empirical, because the data needed to test e.g. behavioral economics theory is readily available as the by-product of sports competitions. The importance of sports economics in undergraduate as well as graduate curricula has rapidly increased in the last 20 years and will continue to grow. In my presentation I will summarize the most recent developments in the economics of professional as well as recreational sports and indicate some (hopefully) promising avenues for future research.



Prof. Dr. Bernd Frick
Paderborn University

ABSTRACTS

Session I: Gender Economics

Wednesday, 25 August, 17:00 CEST

Productivity in Women's Football

Dennis Coates & Meredith Webber

University of Maryland, Baltimore County

E-mail of submitting author: coates@umbc.edu

Abstract

Women football players in the United States, especially those on the National Team (USWNT) have complained of unequal, discriminatory treatment on the basis of gender, by the United States Soccer Federation (USSF) and brought suit against USSF in US federal court. The USSF organizes and supports the selection and participation of both the Women's and the Men's US National Teams. In its defense briefs, the USSF argued that the women do not perform the same work as the men to justify the differences in their pay and other support. In this paper, data for men's salaries and performance in Major League Soccer and for women's performance in the National Women's Soccer Leagues are utilized to compare both how performance translates into team success in the two leagues and to forecast the salaries of women players if they had been compensated the way the men are. Women's salaries are not available.

Motivation

Women in sports have become more assertive in battling for better pay and better financial support of programs for women and girls. In 2017, the United States Women's Hockey Team threatened to boycott the World Championship related to disputes about pay and support from U.S.A. Hockey, the governing body for hockey in the United States. The women of the national team were frustrated over the lack of progress in negotiations with U.S.A. Hockey. Concerning the decision to forego participation in the World Championship, Jocelyne Lamoureux-Davidson, a national team veteran, said, "It's the culmination of trying to negotiate for 14 months and getting nowhere." (Berkman, 2017)

In the last few years, women soccer players from the United States, or non-Americans who had played in the National Women's Soccer League in the US, have moved to Europe in response to better opportunities and greater support. The United States Women's National Team, hot off their second consecutive World Cup title, filed a gender discrimination lawsuit against USSF. In defense of the pay differences between the men's and women's team members, the USSF stated that "plaintiffs and the MNT players do not perform equal work requiring equal skill, effort and responsibility under similar working conditions". (ALEX MORGAN, et al. v. U.S. SOCCER FEDERATION, INC., 2020; USWNT Lawsuit versus U.S.

Soccer Explained, 2020) Public outrage at the comment was further heightened when U.S. Soccer cited specific physical differences between the USMNT and the USWNT as a concrete reason to pay the women's side less than the men. (Tannenwald, 2020) While it is impossible to put women into the men's games and vice versa, it is possible to assess whether given game activities have the same the influence on the outcome of men's and women's games. It is, of course, debatable and probably even controversial, but our contention is that the more similar in their impact on the game are the actions by the players, then the less tenable it is to say the women do not perform the same work as the men.

Data and Methodology

Data comes from three primary sources. The first two sources provide player performance information. For the women, all performance metrics and individual characteristics come from the website of the National Women's Soccer League. There are 783 observations covering the four seasons from 2016 through 2019, the only seasons for which data is on the NWSL website. In those four seasons, the NWSL had teams in 12 areas, with one team changing location (Western New York to North Carolina) and two (Boston Breakers and FC Kansas City) dissolving during our time period. Performance statistics for the men are taken from the website whoscored.com. Men's statistics cover the period from 2013 through 2019, with a total of 3899 observations. During that time period MLS expanded from 19 to 24 teams.

The two websites have numerous player performance variables that are identically measured, like minutes played, total goals and total assists, red and yellow cards; using information on a pair of variables in one data set it is possible to construct an identical variable for the men and women. Among these are key passes, interceptions, clearances and passing success. There are also several similar variables in each that cannot be converted into the same metric; for example, in the men's data is aerial duels won per game and in the women's data we have success rate of aerial duels.

The third source of information is the website of the Major League Soccer Players' Association where salary information for the men is available. Salary information for the women is not available on the internet and emails to the women's players' association were not answered.

The analysis begins with simple comparisons of male and female performance statistics and moves on to estimating the relationship between player statistics and team outcomes. The fundamental question is whether success on the pitch in men's soccer is determined differently than success on the pitch in women's soccer. Equality of coefficients will be tested using a Chow test, and Oaxaca decomposition performed to assess if predicted team performance

differences result from different coefficients on the player performance statistics or because of differences in the levels of those statistics between the men's and women's games.

The second piece of the analysis estimates the pay performance relationship for the men and uses the estimated coefficients with the women's statistics to forecast women's pay. These forecasts are compared to the information available on salaries in the NWSL as a rough way of assessing the relative pay differential.

Results

Regression and Oaxaca decomposition results are not yet available. Comparison of means has only just begun. For example, goals per minute among players in the NWSL has a mean of .0014003 and standard deviation of .0029319; for the men, the same statistics are .0012753 and .0023722, respectively. One cannot reject the null hypothesis that the two means are equal. As another example, this one from the defense, average and standard deviation of clearances per minute in the NWSL are .0198445 and .0202738 while for MLS the statistics are .0030995 and .0138609. Again, one cannot reject the null hypothesis of equal means.

These two examples are, of course, only suggestive that men's and women's performance in their games is on average similar. These examples cannot tell us about how these contributions to matches influence the outcome of the games. Nor can they tell us anything about relative pay for performance between men and women in American professional soccer. They do, however, provide the beginning of a glimpse into the assertion that "plaintiffs and the MNT players do not perform equal work requiring equal skill, effort and responsibility under similar working conditions".

Could More Dunking Help the WNBA?

Nefertiti Walker¹, Thomas Allred² & David Berri²

¹University of Massachusetts; ²Southern Utah University

E-mail of submitting author: berri@suu.edu

Our study

NBA legend Shaquille O'Neal suggested the WNBA would be better if the league lowered the rim so that women could more frequently dunk the ball. This suggests that demand for basketball is related to the frequency that players dunk. There is evidence this is not likely to be true. The highest paid player in the NBA is Stephen Curry and he doesn't dunk. In addition, attendance in the WNBA after 23 years was actually higher than NBA attendance after the same time period. Nevertheless, this paper seeks to test whether or not O'Neal truly understands consumer demand in basketball. To do this we investigate the link between the frequency a team dunks and an NBA team's revenue. In addition, we investigate how dunking impacts a player's salaries. Preliminary results with respect to revenue suggest O'Neal's knowledge of consumer demand matches his ability to hit free throws (O'Neal was a notoriously bad free throw shooter!).

Method and data

We begin with a standard revenue model where a team's gate revenue serves as the dependent variable. The list of independent variables follows Price, Soebbing, Berri, and Humphreys (2010). To the list of factors includes regular season wins, regular season wins in the previous season, a team's star power as measured by the number of All Star votes players on that team received, championships won in the past, stadium capacity, whether the team sold out all of its home games, whether the team is an expansion team, and whether the team's stadium is less than three years old. In addition to these factors, we included dummy variables for teams that were awarded the first three picks in the draft. And finally, we consider how many times players on a team dunk the basketball.

$$\begin{aligned}
 GATE_{it} = & a1 + a2 * WINS_{it} + a3 * WINS_{it-1} + a4 * STARS_{it} + a5 * SCAP_{it} + a6 * DCAP_{it} \\
 & + a7 * DEXP_{it} + a8 * DNEW_{it} + a6 * WCHM_{it} + a7 * DFT1_{it} + a8 * DFT2_{it} + a9 * DFT1_{it-1} \\
 & + a10 * DUNKS_{it} + e_{it} (1).
 \end{aligned}$$

Where:

$GATE_{it}$ = a team's gate revenue (average ticket price * attendance) in a given season

$WINS_{it}$ = a team's wins in the current seasons

$WINS_{it-1}$ = a team's wins the previous season

STARS_{it} = number of all-star votes players on the team received

SCAP_{it} = stadium capacity

DCAP_{it} = dummy variable equal to one if a team is playing at capacity

DEXP_{it} = dummy variable equal to one if team is an expansion team

DNEW_{it} = dummy variable equal to one if a team is playing in a new stadium

WCHM_{it} = championships won in the past (weighted for most recent years)

DFT1_{it} = have the top pick in the draft last year

DFT2_{it} = have the second pick in the draft last year

DFT1_{it-1} = have the top pick in the draft the previous season

DUNKS_{it} = number of dunks in a season

In addition, we wish to know if players who dunk receive higher salaries. Again, the highest paid player in the NBA doesn't dunk. Of course, analysis has to go beyond an anecdote. Our systematic analysis of NBA salaries builds on Berri (2019) and is illustrated by equation (2).

$$\begin{aligned} \text{LOG(AVGSAL)} = & b_0 + b_1 \text{PTS} + b_2 \text{EffFG} + b_3 \text{FTper} + b_4 \text{ORB} + b_5 \text{DRB} + b_6 \text{STL} \\ & + b_7 \text{TOPER} + b_8 \text{BLK} + b_9 \text{PF} + b_{10} \text{AST} + b_{11} \text{GM} + b_{12} \text{GS/GP} + b_{13} \text{SAME} + b_{14} \\ & \text{TMWpct} + b_{15} \text{AGE} + b_{17} \text{D5} + b_{18} \text{D4} + b_{19} \text{D2} + b_{20} \text{D1} + b_{21} \text{DUNKS} + \varepsilon \quad (2) \end{aligned}$$

Where Player Performance Statistics (last two years, adjusted for position played)

PTS = Points Scored per-minute

EffFG = Effective Field Goal Percentage

FT = Free Throw Percentage

ORB = Offensive rebounds per-minute

DRB = Defensive rebounds per-minute

STL = Steals per-minute

TOPER = Turnover Percentage

BLK = Blocked shots per-minute

PF = Personal fouls per-minute

AST = Assists per-minute

Non-performance variables

GM = Ratio of Games Played to number of potential regular season games
(across last two years before contract signed)

GS/GP = Ratio of games started to games played

SAME = Dummy variable, equal to one if player signed with same team

TMWpct = Regular season winning percentage by team that employed
player previous season

AGE = Age of player

D5 = Dummy variable, center

D4 = Dummy variable, power forward

D2 = Dummy variable, shooting guard

D1 = Dummy variable, point guard

DUNKS = number of dunks by the player, the past two seasons

The dependent variable in this model is average salary across a free agent's contract. This will be related to a player's performance the two years prior to the contract being signed. In addition, a collection of non-performance measures is included. These include

- a measure of how many games a player played relative to what he could have played (GM). This measure controls for injuries, which should lower a player's salary offer.
- the ratio of games started to games played, which is included since it is thought that starting players would receive higher offers
- a dummy variable for players who signed with the same team since the NBA's collective bargaining agreement often gives a player's existing team the ability to offer more money to its own free agents.
- team winning percentage, which is included to see if teams give more money to players who played for winners
- the age of the player. Older players will generally be less productive and therefore would receive lower offers.

To this list, we will add the number of dunks the player had the previous two seasons.

Results

Our preliminary results indicate that dunking does not lead to additional revenue. We have not yet investigated salaries. So, it doesn't appear that Shaquille O'Neal is correct about consumer demand. But it is possible people in the NBA – despite what we see with Steph Curry – are paying players to dunk.

The causal effect of past on present performance for women and men - Evidence from top-level Tennis

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Introduction and Motivation

Performance in intermediate contest and performance feedback raise the question of how to react. Does a contestant raise the effort once lagging behind? Or reduce effort (give-up)? Or not change effort at all? These reactions are relevant for a multitude of settings.

Intermediate feedback on relative performance is found to have a causal effect on subsequent effort in education (Azmat and Iriberry, 2010; Azmat et al., 2019; Tran and Zeckhauser, 2012). Contests (or tournaments) serve as an incentive device for effort of employees, by providing information about their intermediate relative ranking or performance. Previous empirical results, however, are conflicting, as performance gaps are sometimes found to have an effort increasing effect (Casas-Arce and Martínez-Jerez, 2009), while other evidence suggests a negative effect of a performance deficit (Gill, Kissová, Lee and Prowse, 2019). In a field experiment involving retail stores, Delfgaauw et al. (2014) find that staff members from a shop, which is trailing in a large-scale sales tournament, do not react at all to intermediate performance feedback. Thus, the empirical evidence is inconclusive. Professional tennis tournaments provide a fruitful setting to study the effects on relative performance feedback, due to high stakes, continuous variation in terms of contestant heterogeneity, detailed (intermediate) performance data, and well comparable situations for the widely discussed potential of behavior difference for men and women.

Data and empirical approach

We use data from 12,839 (4,955 for male (ATP), and 7,884 for female players (WTA)) tennis matches to estimate the effect of conceding and almost conceding a break on subsequent performance.¹ To win a set in tennis (without tiebreak), a player must win a game when returning (break serve). Thus, a break difference (+ or -) has a significant effect on the overall win probability. Any player with a break lead only has to hold this lead and win all remaining service games. A trailing player has to make up for the deficit to avoid losing the set.

¹ All data are available at github.com/JeffSackmann. The data also provide detailed information about player characteristics, the ATP/WTA ranking and points, and the exact information on how each point of the match was decided.

Tennis, like almost all forms of contests, features heterogeneous contestants. Heterogeneity in terms of situational ability will also change over the course of a match. Consequently, using OLS to estimate the effects of performance in game $t-1$ on subsequent performance (in game t) will result in biased estimates from omitting relative situational ability as a key variable. While WTA/ATP rankings provide a proxy for abilities, it is elusive to sufficiently control for all differences in ability.

We suggest an instrumental variable approach and use double faults during the first three points of game $t-1$ as an exogenous shock on the probability of a break in $t-1$. In tennis, a player on serve has two attempts to place a serve inside the corresponding serve box on the field of the opposing return player. In case both attempts are recorded as faults, the point is scored by the returner and a double fault is recorded. It is a plausible argument that very subtle mistakes will lead to double faults. We use only the first three points as any game is decided in at least a minimum of four points. Doing so, we can rule out that we use double faults that are a result of increased pressure at break points or excessive risk taking as a strategy to make up for large within-game deficits.

Double faults – while more frequent for female players² – are a rare event. In order avoid potential direct effects of our instrumental variable on game outcome in t , we use only observations where the break difference in $t-1$ was 0. Doing so, we can rule out that our IV is not exogenous but a result of lack of concentration, reduced effort, or increased risk due to the score difference in $t-1$. To quantify the effect of performance feedback, we estimate

$$break_t = \alpha + \gamma Y_{s,t-1} + \mathbf{X}'_{i,t} \beta + \delta_h + \xi_a + \theta_t + v_{s,t}, \quad (1)$$

where the dependent variable which equals 1 if the game t results in a break, 0 otherwise. $\mathbf{X}_{s,t}$ includes a set of player- and match-specific control variables. To control for unobserved heterogeneity, we include player-season (δ_h), opponent-season (ξ_a), and game-number fixed-effects (θ_t). $Y_{s,t-1}$ measures the relative performance of game $t-1$ in two distinct ways: the coefficient γ measures the causal effect of (i) saving a break point, or (ii) conceding a break in $t-1$ on performance in the observed return game t . We instrument $Y_{s,t-1}$ by using information on double faults during the first three points in game $t-1$.

In a first step, we measure the effect of running into the deficit of a break in $t-1$ on the probability to erase this deficit and break serve in t . For female players, we estimate that the probability of scoring a break in game t decreases by 11.2 percentage points (ppts.) if they concede a break in game $t-1$. Male players experience a similar decrease in their break probability of 10.4 ppts. after their serve was broken (both significant at the 1-% level).

² Resulting from different physical endowments for female and male players who compete on a court with identical measurements.

Considering the sample-means of a breaks, we find that breaks are 31.4% (women) and 41.6% less likely if the return player has conceded a break in the preceding game.

In a second step, we measure the causal effect of defending break points on relative performance in the next game. The first-stage results for both genders confirm that the probability to observe (unsuccessful) break points in game t increase if one or multiple points in the game are decide by a double fault: 19.7 ppts. for female and 17.7 ppts. For male players. In contrast to conceding a break, defending break points does not change the probability to win the set or the overall contest.

For male players, we estimate no significant effect of defending one or multiple break points in game $t-1$ on the probability to observe a break in game t . The point estimate of γ is close to zero at 0.027 and not significant on conventional levels. For female players, however, we estimate a significant and sizeable effect of -0.120 . Female players suffer in terms of relative future performance even when having defended one or multiple break points.

For all estimations, the instrument tests out very strong at F-statistics (Kleibergen and Paap, 2006) ranging from 349 to 1,267. The first stage coefficients are –as expected– positive, as the probability to concede a break or face break points increases when double faults are observed during the first 3 points. In our manuscript, we provide an elaborate analysis of the quasi-randomness of double faults early in games at a particular score.

Summary and conclusion

We find a causal effect of intermediate performance (feedback) on future performance. In particular, we estimate a negative effect of conceding a break (i.e. a reduction in the probability to win) in the previous game on the probability of scoring a break in the subsequent game. This effect is of similar magnitude for female and male players. In addition, we estimate a negative causal effect of allowing (and defending) a break point in $t-1$ on performance in t : Female players are less likely to score a break in t after defending at least one break point in $t-1$. For male players, we do not find such a negative effect.

Negative relative performance feedback with a clear effect on the probability to win the contest does affect future performance for both genders. Women, however, also react to relative feedback that does not create a performance gap and leaves win probabilities unchanged. Such feedback can be interpreted positively (break points saved) or negatively (almost given up a break). A negative interpretation could lead to a decrease in effort and performance. Our results are critical for the design of contests involving performance feedback. The designers of mixed-gender contests (e.g. promotion tournaments in firms) should take our findings into account, as

women and men could react differently to information on intermediate performance. This could lead to undesired outcomes.

Session II: Environmental Economics & Discrimination

Wednesday, 25 August, 17:00 CEST

Air Pollution and Individual Productivity: Evidence from the Ironman Triathlon

Results

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Introduction and literature

Environmental issues related to air pollution are of great importance worldwide. Air quality can substantially affect human health (World Health Organization, 2000; Zivin & Neidell, 2012). However, industrial development increases air pollution levels despite new cleaner technologies.

Air quality monitoring allows to shed light on the adverse effects of air pollution and improve an understanding of economic costs. Numerous medical studies confirm that air pollution is responsible for an enormous global burden of disease, disability, and premature death (Dockery et al., 1993; Cohen et al., 2017; Landrigan et al., 2018). However, even in countries with strict regulation of air quality and a low average level of pollution as the US, pollutant concentration can vary significantly by location.

The analysis of air pollution effects on labor productivity show substantial economic losses. Lu (2020) suggested two mechanisms by which work productivity is reduced: increased absenteeism and increased presenteeism. The former is related to reduced working hours because of worker's or dependents' health care issues. The latter way of labor productivity reduction is associated with a lower efficiency of work. Whereas absenteeism has objective metrics, a change in work efficiency is less measurable in business research because of the variability of tasks and confounding factors.

Previous studies mostly investigate the long-term effect of air quality on worker performance (Chang et al., 2016) or consider experiments with an abrupt change in the pollution level (for example, Hanna & Oliva, 2015). Thus, in the case of current workers, the effect (possibly, delayed) of pollutant accumulation can take place. Eventual change in air quality level, in turn, can affect an individual's behavior and thus influence productivity level (Lu, 2020). A better understanding of the impact of air quality on worker productivity can be gained by also examining short-term effects of being in a particular location.

Adverse effects of air pollution are documented for different kinds of activities (Neidell, 2017). Neidell (2017) shown that improvements in air quality lead to an increase in worker

³ [https://www.who.int/data/gho/data/indicators/indicator-details/GHO/concentrations-of-fine-particulate-matter-\(pm2-5\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/concentrations-of-fine-particulate-matter-(pm2-5))

productivity across several distinct sectors: manufacturing, agriculture, and services. Moreover, adverse effects were found for both indoors (Chang et al., 2016) and outdoors workers (Zivin & Neidell, 2012). Some studies consider also the psychological effects related to air quality. Air pollution is also associated with increased annoyance, anxiety, a decrease in cognitive functioning, and impairment of decision-making quality (Lu, 2020). Thus, in the investigation of air quality effects on individual performance, it can be important to focus on a particular type of activity.

Data

We set out to analyze the effects of air pollutants on individual productivity. We consider the results of Ironman and Ironman 70.3 Triathlons from 2005 to 2019. Data was parsed from CoachCox.co.uk website. Air quality data was collected via the US Environmental Protection Agency's Air Quality System (AQS) API. Only daily average data from sites (stations) within 50 km radius of the location of the race was considered, averaging across multiple sites, if possible. We estimated several regressions with overall time as a dependent variable and O₃ and PM_{2.5} concentrations as independent variables, also controlling for wind speed, temperature, humidity, type of competition (full Ironman course or Ironman 70.3), location, year, and individual athlete effects.

Results

Our preliminary results shows that there is a significant negative effect of ozone: increase by 1 standard deviation of ozone concentration results in 4.78 minutes total time increase (0.8% of average time). These results are consistent with existing literature. We have also found that women might be less sensitive to air pollution on both distances, and professional athletes might not be sensitive to air pollution on the full distance and more sensitive than amateur athletes on half distance.

Consumer and employer discrimination in Major League Baseball – New evidence on the cost of discrimination

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Extended abstract

A number of studies show that employers account for consumer-based discrimination in their employee selection procedure, presumably in attempt to increase profits (Leonard et al., 2010). As an example, US districts with a high share of white residents show evidence for consumer-based discrimination against black employees; as a consequence, employers located in these areas are less likely to hire black workers for jobs that require customer interaction (Laouénan, 2017). More broadly, it is likely that consumers prefer to interact with same-race service employees (Leonard et al., 2004), and many studies find evidence for managers trying to match employees' to customers' racial compositions (e.g., Leonard et al., 2010).

Likewise, although not in direct contact with consumers, it is often assumed that sport fans prefer players to be of similar race as their own (Parsons et al., 2011), and previous research substantiates the belief that fan driven discrimination can impact merchandise and collectibles purchases (Nardinelli & Simon, 1990), All-Star voting (Hanssen, 2001), TV ratings (Kanazawa & Funk, 2001), and stadium attendance behavior (e.g., Tainsky & Winfree, 2010). Conversely, there is mixed evidence on whether sport teams can effectively increase their revenues by matching employees' to markets' racial profiles (e.g., Burdekin & Idson, 1991; Tainsky & Winfree, 2010).

In this study, we investigate the relationship between consumer discrimination, racial matching strategies, and employer discrimination in Major League Baseball (MLB) from 1985 to 2016. First, we predict team-specific mean regular season home game attendance to assess the potential impact of consumer discrimination against minority players on ticket demand that originates from changes in the racial composition of home teams and their local market populations. Second, we test for the presence of employer discrimination by examining the link between winnings, team diversity, and fans' racial preferences. Third, we measure the extent to which team owners engage in racial matching strategies in their player selection procedure. These comparisons offer three complementary ways in which the presence of consumer and labor market discrimination should make itself felt in our panel data.

A central problem in the empirical analysis of discrimination in sports markets is the scarcity of publicly available data on player race and ethnicity (Foley & Smith, 2007; Hamrick & Rasp, 2015; Kahn, 1992). As a consequence, racial and ethnic affiliations are typically determined by manually assessing individual pictures of players and/or players' names and birthplaces (Hanssen & Andersen, 2007; Tainsky et al., 2015). Unlike previous research on discrimination in sports markets, two novelties of our study address these issues by combining automated data acquisition and racial profiling methods to reduce data collection costs and mitigate subjective bias in human race classification. First, we use web scraping techniques to collect data and pictures on more than 7000 individual players; second, we use a deep-learning based facial recognition API to aid us in identifying groups of players with similar racial and ethnic profiles. This unique data set then allows us to analyze potential differences in fans' racial preference effects for various types of athlete-groups that differ in their degree of visibility, position and frequency of appearance: Home game starting pitchers and non-pitchers, and a full season roster specification that accounts for differences in the number of players' game appearances and within-season transitions.

Summarizing our findings, our study provides evidence for of the presence of consumer as well as employer discrimination: both attendance and team performance significantly respond to changes in teams' racial compositions. As a central result, in contrast to finding discrimination against minorities to consistently increase for positions associated with higher visibility, fans' and team owners' racial preferences differ across minority and athlete groups, Leagues, and substantially change over time. For instance, at the beginning of our sample, NL fans show a taste for non-black minority starting non-pitchers, whereas AL fans actively discriminate against them. However, in general, discriminatory attitudes have diminished after the period of racial integration has ended: fans in both Leagues appear to have started developing a taste for racial diversity in the late 1980s. Though, this trend for racial diversity starts to reverse after fans' racial preferences for minority players peaked around the early 2000s. Similar differences exist when considering the relationship between team racial compositions and winnings. For instance, while AL fans show preferences for black and non-black minority athletes during the 2000s, AL team owners consistently discriminate against players of both minority groups. Hence, in addition to providing evidence for the existence of employer discrimination, these results support the view that employer discrimination is not only driven by fans' racial preferences — differences in fans' attendance behavior resulting from consumer discrimination are not sufficient to rationalize the performance gap across athletes of

different race and ethnicity. Furthermore, despite differences in fans' and team owners' racial preferences, baseball franchises tend to engage in racial matching strategies.

Session III: Betting & Voting

Wednesday, 25 August, 17:00 CEST

Underestimating randomness: Outcome bias in betting exchange markets

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Whenever individuals assign too much weight to the observed outcomes when evaluating the performance or the decisions made by an agent, an “outcome bias” is present (Baron & Hershey, 1988). Recent research in sports economics has shown that decision makers are overly influenced by the outcomes of shots (Gauriot & Page, 2019) and matches (Lefgren, Platt & Price, 2015). In particular, Gauriot and Page (2019) showed that coaches give more playing time to players in the following match when players scored a goal after the shot hit the post compared to players who also hit the post from a similar location on the pitch but did not score. Their results suggest that coaches are substantially influenced by an outcome bias when deciding to field players in the next match. Moreover, Gauriot and Page (2019) showed that not only coaches but also journalists and sports fans exhibit an outcome bias. However, it remains unclear whether such an outcome bias is limited to individual decision makers or also translates into prices of betting exchange markets that are based on aggregated beliefs of the bettors.

In this paper, we analyze whether prices in betting exchange markets exhibit an outcome bias. In betting exchange markets, the prices are formed by individuals betting against each other regarding the outcome of future (sports) events. Thus, the betting market is essentially a prediction market where the prices forecast future events (Brown, Reade & Vaughan Williams, 2019). As the participants in the prediction markets profit from precise predictions, they have strong incentives to acquire relevant information, and thus, prediction market prices generally represent accurate forecasts of the underlying outcomes (e.g., Wolfers & Zitzewitz, 2004; Span & Skiera, 2009; Vaughan Williams & Reade, 2016). However, some more recent studies have shown deviations from efficient prices because the prices do not incorporate all available information. For example, Brown, Rambaccussing, Reade and Rossi (2018) find that the aggregate tone of Twitter tweets provides additional information that is not incorporated into the betting market prices. Furthermore, Brown and Reade (2017) find that the aggregation of tips from sports tipsters predicts sports outcomes beyond the betting prices. Thus, participants in betting markets might also overly rely on past match outcomes and fail to adequately consider the role of good and bad luck.

We use data of 9,130 matches played in the top five European football leagues in the seasons from 2013/2014 to 2017/2018. We obtained football data from Gracenote and odds data of the betting exchange Matchbook from oddsporal.com. To measure the luck-component in the match outcomes of teams that betting participants might overly rely on, we follow Flepp and Brechot (2020) and estimate the expected goals for each team in each match. Brechot and Flepp (2020) have shown that the expected goals metric contains more relevant information regarding future team performance than do match outcomes because this metric is less prone to randomness. Thus, the expected goal metric allows us to determine the better team on the pitch in terms of creating valuable scoring chances. Subsequently, we construct an alternative league table based on the expected goal metric. The rank in the expected goals league table (xGT) should reflect a team's playing quality on the pitch more accurately than the rank in the official league table (OLT), because the OLT is solely based on actual match outcomes where bad (good) luck fully translates into fewer (more) points and a lower (higher) rank.

Our main variable of interest is *LTD*, the lagged difference between the rank in the OLT and the rank in the xGT to test whether betting market prices correctly include good and bad luck. *LTD* captures the information of actual performance beyond the match outcomes. Thus, a positive value for *LTD* means that the rank was lower in the OLT than in the xGT and the team is considered unlucky in the past matches. Vice versa, a negative value for *LTD* signals that the team was lucky in the past matches.

Following previous research, e.g., Forrest and Simmons (2008), Franck, Verbeek and Nüesch (2011) and Brown et al. (2018) we use a binary probability model with the outcome of a bet as the dependent variable (equaling 1 if the bet is won and 0 if lost). As the explanatory variables, we use the winning probability implied in the odds, i.e., the reciprocal value of the odds, and our variable of interest *LTD*. If the betting prices are efficient, all relevant information should be reflected in them, and no additional variables should have predictive power regarding the outcome of an event. In other words, if the bettors do not fall for the outcome bias and instead correctly assess the randomness component in match outcomes, the *LTD* variable should not have explanatory power beyond the implied winning probabilities. However, if the bettors overly rely on past match outcomes, the information contained in *LTD* might not be correctly reflected in the betting market prices.

We find that *LTD* has a positive and significant impact on the outcome of the bet while controlling for implied winning probabilities. Thus, the betting market prices are not entirely efficient. More specifically, our results show that the implied winning probabilities of teams that were lucky, i.e., teams that are higher ranked in the OLT than in the expected goals table,

were overstated. Conversely, the implied winning probabilities of unlucky teams were understated. This is mirrored in lower returns for bets on previously lucky teams and higher returns for bets on previously unlucky teams. Thus, this finding can be exploited with a simple trading strategy by betting on unlucky teams and betting against lucky teams. An out-of-sample backtest of this simple strategy yields a positive betting return even after a commission fee of 5% is deducted. These results strongly indicate that the participants in betting markets overweight past match outcomes and exhibit a behavior consistent with the outcome bias.

This paper contributes to the literature in various ways. First, we show that the outcome bias also exists in betting exchange markets where the prices reflect the aggregated beliefs of the bettors. Despite wagering their own money, bettors, on aggregate, seem to fall victim to the outcome bias by not correctly incorporating the actual past performance of teams in their betting decisions. Thus, our findings are consistent with the literature on the outcome bias and it seems that the outcome bias might be much more widespread than anticipated so far. Finally, we contribute to the literature on betting market efficiency by demonstrating that the outcome bias distorts the prices and abnormal returns could be generated by accounting for good and bad luck.

Patterns of betting behavior for news in live betting markets

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Introduction

The gambling and sports betting markets have seen rapid growth in recent years, reflected in substantially increasing gross gaming revenue. It measures the money bookmakers generate from their clients and rose to nearly 100 billion euro in 2019 in Europe. As a particular segment of betting markets, live betting is becoming more and more popular and account nowadays for about 75% of the overall betting volume.

Although live betting markets are comparable to financial markets – a bet on a team is like buying a company's stock – these markets have not been investigated empirically. Corresponding research on financial markets meanwhile is extensive and (e.g.) covers how news affect markets (Chua et al., 2019, Haroon et al., 2020) in terms of traders' investment and resulting impact on stock prices. Still, live betting markets in sports are even better suited for such analysis for three reasons: 1) bets have a well-defined endpoint after which their value becomes observable (Thaler et al., 1988), 2) news like goals refer to a single identifiable point in time and 3) news become immediately available to all market participants, e.g., bettors, due to the live coverage of the match on television or the internet. Given such valuable features, live betting markets surprisingly have rarely been investigated in the literature – likely due to unavailability of data. As a novelty of this paper, we are the first to not only investigate live betting odds, but stakes in live betting. Such stakes are not the price of a potential investment, but the investment itself. The aim of our paper is to uncover patterns in the betting behavior in live betting markets with a focus on the behavior of bettors' right after the arrival of important news, such as goals.

Data

We analyze high-resolution live betting data from a large European bookmaker. It comprises second-by-second stakes for all 306 matches of the 2018/19 season in the Bundesliga, the highest German football league. Each match is divided into two time series, one for bets on each team. Specifically, in our analysis the stakes placed on the match outcomes serves as response variable. To obtain regular time series, we aggregate betting volumes into 15-second intervals as the raw data itself is sampled in irregular time intervals.

Model

Our modelling framework for betting behavior is driven by an unobservable (latent) market activity level. Specifically, we use a state-space model (SSM) approach which is a generalized version of a hidden Markov Model – namely, having an infinite number than having a finite number of states. Both types of models are popular statistical tools for settings in which certain processes are hidden – in our case, the latent market activity level. In general, the SSM consists of an unobserved state process, which again is modelled by a Markov Chain, as well as an observed state-dependent process.

For our analysis, the observed stakes depend on the Markov chain as they follow a zero-adjusted gamma distribution (ZAGA), the parameters of which are driven by an unobserved autoregressive state process. The ZAGA distribution reflects the structure of the response variable as the stakes placed are either positive or zero (Rigby et al., 2019). The occurrences of intervals without stakes placed are most often caused by the bookmaker closing the market, e.g., immediately after a goal. Nevertheless, we also observe intervals without stakes placed when the market is open, and betting is possible. As this usually occurs towards the end of those matches which seem decided, we incorporate covariates regarding the remaining amount of time as well as the actual difference in win probabilities, derived by the actual odds.

We incorporate exogenous static covariates for the state-dependent process and dynamic covariates for the state process. Static covariates comprise the strength of teams, as we assume a sentiment bias (Feddersen et al., 2017) as well as match characteristics like the weekday of the match, as we assume stakes to vary across weekdays (Humphreys et al., 2019). Dynamic covariates are associated with in-game dynamics which can be referred to as “news”. We mainly focus on the occurrence of goals as well as on the deviations of win probabilities compared to those at kick-off. Here, news is referred to unexpected match courses which are directly observable via the actual win probabilities.

Results

Our results indicate a strong serial correlation in the state process, i.e., a high persistence in the underlying market activity level. We further find the betting volume to increase during halftime, which is in line with the existing literature (Reade et al., 2014), and that goals increase (decrease) the market's activity level underlying the stakes placed on the team that scores (concedes) a goal. This is a remarkable result as bookmakers lower the odds after goals have been scored. Though, our results indicate that the effect of the occurrence of goals is significantly larger than the effect of decreased odds.

Moreover, news as indicated by unexpected match dynamics increase betting volumes. This result is intuitively plausible, as bettors tend to bet more on teams if they, for example, score the equalizer when playing against a clear favorite as if this team scores a goal which leaves it still down by four.

Discussion

While exploratory in nature, our approach yields plausible results and given its flexibility can form the basis for more detailed investigations for various research areas. Methodologically, in future research the model could be further modified. The underlying state process – as a proxy for the latent market activity level – may not only influence the stakes placed on the team analyzed but rather also those stakes on the opposing team and vice versa. Accounting for such dependencies, a two-dimensional time series for each match would arise rather than investigating two distinct time series. In such a modelling framework, a possible replacement for the autoregressive process would be a vector-autoregressive process.

By aggregating the betting volumes into intervals of 15 seconds to obtain a regular time series for our discrete time analysis, we simplified the data structure. By exchanging the autoregressive state process by its continuous-valued counterpart, an analysis of data sampled at irregular time intervals serves as another interesting methodological extension.

A further application of our model could serve in the field of fraud detection. As in recent years, several match-fixing scandals occurred, using the models developed, one could investigate extreme outliers based on residuals. Those matches which are unusual with respect to the predicted model shall then gain further attention by the authorities in order to uncover potential match fixing.

Differences in Jury Voting, Peer Voting, and Fan Voting - Analyzing the NFL's All-Pro and Pro-Bowl Voting Outcomes

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Relevance and Motivation

Expert jury voting decides sporting results in several disciplines and its biases have been analyzed, *inter alia*, with a view to figure skating and ski jumping (Campbell & Galbraith 1996; Zitzewitz 2006). Despite being not free from voting biases, experts are believed to be knowledgeable, led by pure sporting aspects and vote according to the matter-of-fact goals of the vote than fans. Fans are expected to compensate their lack of expertise by relying on secondary criteria that deviate from the original goal of the vote (Franck & Nüesch 2008). Thus, expert panels where each expert vote for herself and the result is the sum of the votes are conjectured to be determined by objective criteria (juries), whereas peer voting groups and public voters are supposed to be heavily influenced by all sorts of subjective superstar and popularity aspects.

To the best of our knowledge, the literature so far has not taken advantage of all-star team votes in team sports to approach research questions of voting behavior. We address this gap by looking into the voting outcomes for all-star teams in American Football. In the context of the NFL, award winning all-star teams are compiled through voting processes of different styles: The All-Pro Awards and the NFL's Pro Bowl. Choosing this topic allows us to investigate the voting behavior of three different groups: next to (i) industry pundits (experts) and (ii) fans ("audience"), (iii) insider professionals (internal peers; players and coaches) also participate in the voting. In an empirical analysis of data from the annual All-Pro Awards and NFL Pro-Bowl votes, we tackle two research questions. First, what differences exist between expert (jury) voting, peer voting and fan voting? Second, why does the voting behavior of the three groups differ, i.e., which influence factors drive expert voting, peer voting and public voting?

Thus, we add to the literature by providing more differentiated insights into the voting determinants and biases of different voting groups. These conjectures may influence the allocation of voting rights between experts and laypersons in so different areas of society as law proceedings (judges versus jurors), political systems, and entertainment contests. Thus, the

empirical determinants of different groups' voting behavior provide valuable knowledge about the likely effect of vote designs.

Related Literature

Comparative voting behavior has been empirically analyzed in the literature in the context of sports disciplines where expert juries determine the result like figure skating and ski jumping (Campbell & Galbraith 1996; Zitzewitz 2006) and College football ranking (Campbell, Rogers, & Finney, 2007). Further empirical analysis of expert voting systems includes music contests like the Eurovision Song Contest, where both expert juries and the television audience vote for the winner (inter alia, Haan et al. 2005; Ginsburgh & Noury 2008; Spierdijk & Vellekoop 2009; Budzinski & Pannicke 2017a), in addition to instrument-playing related music competitions (Flôres & Ginsburgh 1996; Glejser & Heyndels 2001; Ginsburgh & van Ours 2003). Public voting, its influence factors and biases are analyzed in the context of diverse music contests (Lee 2006; Budzinski & Pannicke 2017b; Kim et al. 2021). This literature altogether establishes two main insights: firstly, expert juries are indeed less biased than audiences but, secondly, expert juries are not unbiased but are also influenced by aspects like stardom and popularity of contestants or national and regional proximity.

Methodology

We analyze the voting outcomes of All-Pro selections and Pro Bowl selections as unbalanced panel data over 78 seasons (1951-2019). All players in the sample made either one or both awards. In voting for the All-Pros, groups of media members e.g. broadcasters and writers as well as other experts covering topics around the NFL cast their votes on the best player at any single position (expert voting). Voting for the Pro Bowl employs a different process. Until 1995, only players and coaches had voting rights (peer voting). In 1995, in an attempt to raise the legitimacy of the All-Star selections the NFL introduced fan voting (public voting). From that year onwards, public voting accounted for one third of the votes (NFL Players Association, 2020). This leads us to three subsamples of the data set: players that made an All-Star team (expert voting), players that made the Pro Bowl previous to 1995 (peer voting), and players that made the Pro Bowl after 1995 (peer and fan voting combined).

All-Pro	Pro Bowl	
<i>Expert jury voting</i>	Before 1995	After 1995
	<i>Peer voting</i>	<i>Peer & Fan voting</i>

We employ panel probit regressions to assess the impact of objective markers of quality on the outcome probability of the binary outcome of winning one of the mentioned awards. These objective markers of quality are touchdowns (rushing, passing, receiving), interceptions (thrown and caught), sacks (and outstanding defensive plays, so-called "solos"). We control for

experience (measured in years in the league), play time (number of games played, number of games as a starter), as well as team performance (Win-To-Loss ratio, margin-of-victory) and team-fixed effects. This enables us to assess the impact of influence factors and possible biases as a deviation from the objective markers of quality in the respective voting groups.

First, the influence of these factors on the probability of being among the group and winning an All-Pro award is examined. This allows for an estimation of what drives expert voting. Secondly, the same model is estimated for the probability of being selected only to the Pro Bowl, prior to 1995. This gives us an estimation of what drives peer voting outcomes. Thirdly, the impact of fan voting is assessed as the difference in the influence of covariates before and after 1995. We create interaction terms between the inclusion of fan voting and the covariates to estimate their influence in the before and after period. This enables us to draw conclusions on how the results in Pro Bowl voting changed through the inclusion of public voting. The margins of these models are calculated to allow for a discussion of the differences.

Results and Conclusions

Our results show that expert voting, peer voting and public voting have significant differences. Experts are largely able to identify objective markers of quality reliably. Peer voting identifies offensive markers (touchdowns, yards, sacks, solos) similar to the experts with a stronger weighing on receiving touchdowns (highlight bias), and a smaller sensitivity to negative quality (mistakes of players). With the inclusion of fan voting, objective markers have not lost any of their significance, so, in contrast to music contests, we do not find evidence for public voting biasing the outcomes towards a less matter-of-fact based voting outcome than with peer voting.

Expert voting seems to be susceptible to exposure effects as measured in number of games. We do not find the same effect of exposure in peer or fan voting. However, being a starter has a significant positive effect in peer voting. This indicates a sensitivity of peers to the social rank/label among the group. With the inclusion of public voting, experience as in years that a player has been in the league has become significantly more important in Pro Bowl voting, indicating a familiarity bias of fans. We find some team effects in expert voting, e.g. margin-of-victory of a team positively biasing their assessment of a player. We do not find the same significant team effects in Pro Bowl voting. Therefore, peer and public voting could be less biased towards teams of players than previously expected, where expert voting might be bias towards an affiliation.

The result of the study is that expert voting differs more from peer voting than public voting does from peer voting, and both are able to identify objective quality with notable

differences in the weight of factors for the outcome. We performed robustness-checks and the results still hold true.

Session IV: Sport Participation

Wednesday, 25 August, 19:00 CEST

Youth Sport and Mental Health: Can sport contribute to solving the mental health crisis?

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Introduction and Motivation

It is widely recognized in the UK that there is a mental health crisis with young people aged 18 years and under. NHS data from 2018 indicates that approximately 400,000 young people have made use of relevant health services, with an approximately 30% increase in GP referrals over the same period in 2016 (O Hara, 2018). Moreover, there are also warnings from charities such as Barnardo's that treatment is not available and there is an urgent need to tackling the crisis in children's mental health through investment in specialist services and - early intervention programs in every school (Barnardos, 2020). The aim of this paper is to explore the research question: 'Can sport contribute to improving the mental health of young people?' To answer this question, this paper makes use of instrumental variable estimation on data drawn from large-scale survey data in the UK. Controlling for important confounding variables, including parental support, the analysis shows that participation in sport can improve the mental health of young people. It follows that increased focus on sport in schools and the community can contribute to the flourishing of young people. Importantly, this is consistent with current shifts in health policy stemming from (WHO, 2011) and embraced in the recent National Health Service long term plan (NHS England, 2019), in which health should be viewed more as an asset that contributes to wider well-being and flourishing (Hanlon, Carlisle, Hannah, Reilly, & Lyon, 2011) than the treatment of disease (Baker, 2014)

Literature review

There is now a well-established and large economic literature that examines the impact of sport on both health and well-being (Humphreys, McLeod, & Ruseski, 2014; Lechner, 2009; Wicker, Coates, & Breuer, 2015) and the nuanced trade-off between these (Downward & Dawson, 2016). However, this invariably focusses on general health (as well as well-being) and explores adults. There is some research that explores the impact of family constraints on sport participation (Ruseski, Humphreys, Hallmann, & Breuer, 2011) and even direct peer effects (P. Downward & Rasciute, 2016), but this does not them explore the impact of this on outcomes. Moreover, there is some literature that explores the effects of young peoples' physical activity, but this tends to focus on the impacts on either social capital (Schüttoff, Pawlowski, Downward,

& Lechner, 2018) or physical health (Felfe, Lechner, & Steinmayr, 2016). The current research thus seeks to fill this gap in the literature by addressing the impact of young people's participation on their mental health.

Data and variables

The data are drawn from The UK Household Longitudinal Survey (University of Essex, 2019). This data set has superseded – and now encapsulates - the British Household Panel Survey. It began in 2009 with Wave 1 and surveys approximately 40,000 households in the United Kingdom. Face-to-face interviews are conducted in the respondents' homes or through a self-completion online survey. Young people – which is the focus of this research - aged 10-15 complete a youth questionnaire. Other respondents aged 16 and over complete the adult survey.

The first wave of the data is employed as this wave includes measures of both youth mental health, and their sports participation. After this date these variables are measured in different waves. Youth mental health is measured by responses to the Strengths and Difficulties Questionnaire (Youth-in-Mind, n.d.). Sport participation is measured by the frequency of participation over the last week. Key confounders are included in the analysis and these include the youth's sex, age, their use of social media, smoking and drinking, presence of siblings in the home, whether they have close friends and whether-or-not they are generally alone. Important family contextual variables include the frequency that the young people can talk to their mother and/or father and family income.

Main Results

Based on instrumental variable estimation the frequency of sport is shown to causally reduce the total difficulties experienced by young people. Other important results from the confounding variables indicate that increases in the use of social media and isolation from others are associated with greater total difficulties compared to having close friends and being able to talk to their father. As there are typically less families with fathers in them – single parent families predominantly including mothers - this result is indicative of the importance of father figures to young people (Booth, Scott, & King, 2010).

Conclusions

The current analysis identifies that sport can be an important ‘intervention’ that promotes young people’s mental health. With constraints on the timetabling of sport in UK schools, as well as the recent challenges to the sports infrastructure in the UK during the pandemic, and concerns in general about young people’s mental health, the current research reaffirms the importance of providing opportunity for young people to be physically active.

Deconstructing the health benefits of sport participation: how are the amount, intensity and type of sport participation associated with socioeconomic differences in obesity, diabetes and all-cause mortality?

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Background

Physical activity (PA) has many positive health effects, including increased life expectancy. Regular participation in physical activity was also associated with significant lower changes of being diagnosed with type 2 diabetes mellitus (T2DM). In addition, an individual with a lower level of education or income is likely to have a shorter life and a lower health status, than someone with a higher socioeconomic status (SES).

Various studies have investigated the contribution of lifestyle factors, including physical activity (PA), to socioeconomic health differences. Differences in the amount, intensity and type of PA may partially explain both differences in health effects and the measured differences in the contribution of SES to socioeconomic health. For instance, work-related PA often has been associated with negative effects on health, while leisure-time PA is related to positive health effects. Summarizing, sport participation may be a more effective way to improve health than other forms of PA.

Although sport is a subset of PA, it is also a broad concept with many different facets, including the amount, intensity and type of sport individuals practice. Sports participation is lower among people with a low SES than among high SES groups. Therefore, it is interesting to investigate to what extent sport participation contributes to socioeconomic health differences. Evidence on the relationship between the volume of participation in specific sports and health outcomes is somewhat mixed. To our knowledge, no study has simultaneously looked at the amount, intensity, types and number of sports an individual does as the potential drivers for the health effects of sport participation.

Our research question is to what extent is sport participation itself and different aspects (the amount, intensity, types and number of sports) of sport participation associated with differences in mortality and the incidence of type 2 diabetes mellitus (T2DM) and obesity, between as well as within different socioeconomic groups? To put the outcomes for sport participation in perspective, we compare them with the outcomes for doing MVPA in general.

Methods

Lifelines is a multi-disciplinary prospective population-based cohort study examining in a unique three-generation design the health and health-related behaviors of 167,729 persons living in the North of the Netherlands. Participants are screened through physical examination, including anthropometry. In addition, they fill in questionnaires on, amongst others, demographics, health status, lifestyle and psychosocial matters. Baseline measurements took place from 2006 until 2013. A full-population follow-up measurement (2A) was conducted between 2014 and 2017, with new physical examinations and questionnaires for the full (surviving) population. Mortality was registered on a monthly basis until the end of 2019. From the full cohort population of the Lifelines study, persons with missing or implausible data for any of the variables included in our analysis were excluded. For mortality, 84,230 persons remained for the analysis. Due to a limited response to the follow-up questionnaires and lacking or incomplete glucose or anthropometry measurements, for T2DM the remaining sample size was 56,517, while for obesity this was 49,435.

Sports participation, as well as the other types of PA, were assessed using the short questionnaire to assess health-enhancing physical activity questionnaire (SQUASH) that inquired about the frequency, intensity and duration of these activities. For sport participation, we defined a dummy variable for doing any sport and the amount of sport practiced was measured in the number of minutes per week. For sport participation, the total intensity was measured by summing the intensity (MET-values) over all activities. Furthermore, we distinguished the following types of sports practiced: individual sports, semi-individual sports and team sports or fitness activities (i.e. going to the gym). PA with a MET-value of 4.0 or higher was categorized as moderate to vigorous physical activity (MVPA). Education functions as the determinant for socioeconomic status. We distinguished three levels of education: low, middle and high. Outcome variables in our analysis were dummy variables for the incidence of T2DM and all-cause mortality, measured at any time beyond baseline.

For our analysis, we estimated several Cox proportional hazards regression models.

We first estimated the associations of each sport participation/physical activity indicator and all-cause mortality and the incidence of T2DM and obesity, for the full sample. Next, we look at the effect of sport participation on the differences between socioeconomic groups in the incidence of T2DM and all-cause mortality, following the methodology of Stringhini et al. (2011). Finally, we look at the association of sport participation on health outcomes within different socioeconomic groups.

Findings

There was a clear socioeconomic gradient in sports participation, from 45.1% of the lower educated doing sports up to 69.5% of the higher educated. By contrast, for persons that practiced sports, socioeconomic differences in the amount, total intensity, types and number of sports practiced, were relatively small. For mortality the incidence rate was 1.0%, for T2DM 1.3% and for obesity 4.4%.

Using Cox proportional hazard regressions, we demonstrate that sport participation is significantly associated with lower mortality, T2DM and obesity. Sport participation was significantly associated with lower mortality (HR = 0.81), less T2DM (HR = 0.70) and less obesity (HR = 0.77). The hazard ratios for participating in any sport (compared with doing no sport) were somewhat higher, but not significantly so, than those for doing any MVPA (compared with doing no MVPA). For the amount of sport participation as well as intensity, no dose-response relationship was found. The same was true for intensity of sport participation. Fitness activities (HR = 0.92) were associated with significantly higher odds of becoming obese than the other types of sport (HRs between 0.60 and 0.70). Of the other three sport types, team sports have a significantly lower hazard ratios for mortality (HR = 0.53) than the other sport types.

Sport participation reduced the hazard ratio for socioeconomic differences with 22.3% for mortality, 11.8% for T2DM and 11.0% for obesity. For the amount, total intensity and number of sports similar effect sizes were found. By contrast, doing any MVPA the reduced the hazard ratio for the socioeconomic gradient with only 9.0% for mortality, 5.1% for T2DM and 5.3% for obesity. For the three educational levels separately, we found that the associations between sport indicators and health outcomes were to a large extent similar to the findings for the whole sample. The main difference was that the associations were mostly non-significant for the SES categories, due to a lack of power.

Conclusion

The outcomes of this research show that sport participation substantially, and more than MVPA, reduce socioeconomic differences in health outcomes. Since we found no significance differences in the association of sport participation with the health outcomes between SES level, the socioeconomic health equalities are likely to be mainly caused by differences in the sport participation levels. Our results suggest that to reduce socioeconomic differences in health, public health policies should focus on increasing sport participation levels in low SES groups, rather than the amount or intensity or MVPA levels

The Effect of Sport in Online Dating: Evidence from Causal Machine Learning

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Introduction

Human interactions that have traditionally taken place in physical reality have increasingly shifted to the online world and the COVID-19 pandemic has substantially accelerated this trend. Human mating is also affected by this development, resulting in numerous novel formats of online dating. Indeed, online dating emerged as pivotal instrument for human mating. Rosenfeld, Thomas, and Hausen (2019), for instance, showed, that online dating represents the most common way for heterosexual couples to meet in the US. Cacioppo, Cacioppo, Gonzaga, Ogburn, and VanderWeele (2013) furthermore showed, that more than one-third of marriages in the US (2005-2012) are attributed to an initial contact via online dating.

Literature

Understanding the mechanisms that explain human mating in online dating environments is, in turn, decisive to elucidate the structure of societal evolution and to derive algorithms increasing the efficiency of the matching of potential partners. Explaining human mating in online dating environments relies essentially on the information that users share online, including socio-demographic, psychological, and physical traits. Indeed, previous research referred to socio-demographic (e.g., age; Hitsch, Hortaçsu, & Ariely, 2010) and psychological (e.g., extroversion; Cuperman & Ickes, 2009) traits to explain human mating in online dating environments (for a detailed review, see Eastwick, Luchies, Finkel, & Hunt, 2014). Research considering physical traits, commonly interpreted as sport activity (Schulte-Hostedde, Eys, Emond, & Buzdon, 2012), to explain human mating in online dating environments, however, remains sparse even though few research provides indications that sport activity has substantial effects on human mating (Schulte-Hostedde et al., 2012). However, the effect of sport activity on human mating has not yet been fully understood. This paper attempts to fill this gap. In particular, this paper is, to the best of our knowledge, the first to investigate the causal effect of sport activity on human mating in online dating environments. It is also the first paper to analyze the heterogeneity of this causal effect using the novel causal machine learning methods.

Data and Methods

Following this notion, we leverage unique data of more than 16'000 users, forming altogether almost 180'000 interactions. The data allows us not only to map interactions among users on a second-by-second basis, including visiting a user profile and contacting a user via private message, but also to observe more than 600 user characteristics describing the socio-demographic, psychological, and importantly, physical traits, including the frequency of the sport activity. This setting allows us to create a credible research design that eliminates potential sources of endogeneity by focusing on the first, one-way interactions between users, and by observing essentially the very same information, and even beyond, as an actual user. Hence, we can reliably identify the effect of sport activity on contact chances by relying on the conditional independence, i.e. the unconfoundedness research design. Moreover, we exploit recent advances in causal machine learning to estimate the causal effect of sport activity on contact chances in our large-dimensional setting in a very flexible way, while considering potential effect heterogeneities. In particular, we apply the Modified Causal Forest (Lechner, 2018), an estimator that reams the concept of Causal Trees and Forests, by allowing for multiple treatments, as applicable to our measure of sport activity. Furthermore, the Modified Causal Forest improves the splitting rule to account for selection bias and the mean correlated error. Additionally, it allows for estimation and inference on different aggregation levels in one estimation step. All of these aspects are crucial and beneficial for our research. Specifically, we can relax on the functional form assumptions, unlike classical parametric approaches, which is particularly important in large-dimensional settings as ours. Moreover, we can go beyond average effects and can flexibly investigate effect heterogeneities on various aggregation levels.

Results

Leveraging the benefits of the Modified Causal Forest, we find different patterns for males and females. Particularly, for male users, we observe uniformly increasing contact chances by a potential female partner, for increasing levels of sport activity. Specifically, the contact chances increase by more than 50% if male users practice sport on a weekly basis, relative to no sport at all. However, for female users, we do not find evidence for such an effect. Beyond the average effects, we uncover interesting effect heterogeneities both for males and females. In particular, for male users, we find that the effect of sport frequency on contact chances increases with higher income. This holds true for the income levels of the male users themselves, as well as for the income levels of the potential female partners. This implies that higher income male users enjoy a higher effect of a weekly sport activity, and that higher income female users value the regular sport activity of the potential male partners more. These

heterogeneous effects are both statistically precise, as well as substantially relevant. In addition, for female users, we find indications that the effect of sport activity on contact chances increases with a higher sport frequency of the potential male partner. Furthermore, analyzing the individualized effects provides additional descriptive evidence for these heterogeneous effects. It reveals further insights for potential heterogeneity mechanisms driven by education level or relationship preferences, among others. Lastly, a placebo test shows the robustness of our results.

Conclusion

This study contributes to research and practice as well as to the society. First, this paper provides new insights for the literature on human mating by demonstrating that sport activity, a key behavioral trait, affects human mating. Second, this paper supports social science research in assessing causal effects in large-dimensional data environments by showcasing an empirical approach, which allows for a very flexible estimation of average effects as well as a systematic assessment of underlying heterogeneities. Third, this paper helps individuals to increase their dating success by exhibiting how sport activities can contribute to the likelihood to be recognized by potential partners, finally highlighting the relevance of sport activity not only from a health but also from a human mating perspective. Finally, this paper serves product developers to improve the architecture of online dating platforms by highlighting the relevance of sport activity, while considering effect heterogeneities (e.g., demographic characteristics) at the same time.

Session V: Bias

Wednesday, 25 August, 19:00 CEST

The effect of crowds on petty-crime law enforcement: A natural experiment from European football leagues

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Introduction and Theoretical Framework

Some criminal acts are more likely to occur in crowded areas (e.g. crowded shopping areas, at bus stops, and on public transportation, among others). In particular, petty crimes are more likely to go unnoticed in crowded environments in which criminals tend to target victims based on an appearance of inattention. This paper uses European professional football leagues as a laboratory in which crowded and noisy places are represented by full stadiums and petty crimes reported are proxied by fouls and misconduct committed and sanctioned during match play.

The analogy between full stadiums and crowded public spaces can be explained in terms of the atmosphere, i.e. the noise environment fans produce in full stadiums. In such a setting, some players' fouls and misconduct can go unnoticed (like pickpockets in crowded public spaces). Additionally, in terms of referees' behavior, fan pressure could distract the referee or make him to more rash and/or erroneous decisions (again, similar to what police experience in crowded spaces).

The COVID-19 pandemic offers the opportunity to study a unique natural experiment. The 2019/20 football season in Europe was interrupted in mid-March by coronavirus spread and the COVID-19 disease. In the "Big-Five" football leagues in Europe, competition resumed in June 2020 (except for French *Ligue 1* that announced the end of the season in April 2020), but all matches had to be played behind closed doors under governments' plans to combat COVID-19. With some minor exceptions, European leagues started the next season (2020/21) in empty stadiums.

Brief Literature Review and Research Questions

Recent studies have considered the COVID-19 lockdown effects in football including, among others, Cueva (2020), Ferraresi and Gucciardi (2020), Reade et al. (2020) and Scoppa (2020). In particular, Bryson et al. (2021) and Endrich and Gesche (2020) focused on the effects of an absent crowd on referees' behavior and decision-making. The aim of this paper is to test whether playing behind closed doors (crowd-absence) affects the number of fouls called by referees (petty crimes reported). Without fans, pressure fouls and misconduct will receive more

notice and a greater number of fouls might be called. On the other hand, in such setting there is less incentive for players to engage in misconduct or commit fouls since they may not feel “protected” by a noisy environment (the likelihood of going unnoticed is lower), so fewer fouls are expected to be committed, and thus called. Finally, in empty stadiums, the referee is expected to be more attentive to play because of reduced distractions.

The Implementation of Video Assistant Referee (VAR)

VAR review of play was implemented in the “Big-Five” European Leagues beginning in the 2017/18 season (Carlos et al., 2019 discuss the effects of VAR implementation). This increased monitoring is expected to affect players’ behavior regarding fouls and misconduct (petty crimes are less likely to occur when police presence is felt) as well as referee (police) behavior, much like body cameras affect police actions.

Methodology

Data and Descriptive Analysis

Data on 10,088 matches played in the “Big-Five” European leagues were collected for seasons 2015/16 to 2020/21 (still in progress). Table 1 shows summary statistics on fouls called by league and other important league characteristics.

Table 1

Number of fouls, VAR implementation.

	<i>Bundesliga</i>	<i>EPL</i>	<i>La Liga</i>	<i>Ligue 1</i>	<i>Serie A</i>
Total number of fouls – mean (SD)	26 (6.604)	22 (5.198)	28 (5.953)	27 (5.855)	28 (6.579)
VAR implementation (season)	2017/18	2019/20	2018/19	2018/19	2017/18
Total number of matches (sample)	1,708	2,125	2,115	2,033	2,107

Preliminary Results

Regression models explaining variation in the total number of fouls called per match were estimated separately for each of the “Big Five” European football leagues. These models included indicator variables for the period when no fans were present, and also indicator variables for the period when VAR referee oversight was in place in each league. The ratio of the home team win betting odds to the away team win betting odds for each match were included to control for expected match outcomes. The models currently include the half time goal differential to account for intensity of play during the match.

Table 2 shows preliminary results. All estimated standard errors were cluster corrected at the match level. All models contain home team fixed effects terms. Parameter estimates show how removing fans and providing additional referee oversight affected the number of fouls called.

Table 2

Total fouls by league (SE clustered at match level; home team FE included)

Variables	Bundesliga	EPL	La Liga	Ligue 1	Serie A
Var	-4.237***	-0.009	-0.588*	0.114	-2.694***
COVID-19 lockdown	1.354***	1.121***	-0.235	-0.035	0.627*
Betting Odds ratio	-0.028	-0.217***	-0.040	-0.102*	-0.087**
Half time goals diff.	0.075	0.121	0.143	-0.025	-0.060
Adjusted R2	0.183	0.078	0.051	0.038	0.122

Note: *p<0.1; **p<0.05; ***p<0.01

Main Results and Other Considerations

From Table 2, playing matches behind closed doors had a positive impact on the number of fouls sanctioned in football matches, but the effect was limited to German *Bundesliga* and English *Premier League* matches. This is in line with results in Endrich and Gesche (2020) who reported a significant increase in the relative difference of fouls called against *Bundesliga* home teams in so-called “Ghost Games”. On the other hand, VAR implementation led to a significant reduction in sanctioned fouls in both German *Bundesliga* and Italian *Serie A* matches. An issue to further explore and a limitation to be acknowledged, is that actions by players that might be called a foul are not observed but actual calls (which is analogous to arrests). Proxying for the amount of underlying “borderline” criminal behavior will be difficult in this setting.

As for the model specification, other controls for in-match player behavior will be considered (for example team shots, shots on target, corners...). Additionally, “environmental” variables such as each match weekday or time of match start should also be considered

Rot-Jaune-Verde. Language and Favoritism: Evidence from Swiss Soccer

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Abstract

We utilize data from soccer games in the top two Swiss divisions between the 2005/06 and 2017/18 seasons. In these games, a referee can share the same linguistic area with one of the teams. Using referee-per-season fixed effects, we find that referees assign significantly more penalties, in the form of yellow cards, against teams from a different linguistic area. We also find some evidence in the highest level league only, that the referees assign more red cards to teams from a different linguistic area and that away teams achieve fewer points when home teams share the same linguistic area with the referee. Our analyses suggest that the most plausible mechanism driving our results is unconscious prejudice against the out-group members.

Research Question

This paper investigates possible linguistic bias in Switzerland, a country with four official languages: German, French, Italian, and Romansh. The federal government's working languages comprise the first three, all of which are included in the title of this paper. The Swiss Constitution explicitly prohibits any linguistic discrimination. Even in the absence of further legislation, this binds the country's judicial system, as well as the state, in its role as an employer against practicing linguistic discrimination. Nevertheless, Switzerland has experienced a lot of tension over the years regarding language issues. A recent example is over the usefulness of teaching English, versus French or German in schools. For instance, French cantons objected to English becoming the first non-native language taught in German-speaking cantons. The existence and extent of linguistic discrimination in Switzerland is an open question because instances of discrimination in legal and employment proceedings can be difficult to systematically identify.

To answer this question about language bias in Switzerland, we use a real competition between professionals to investigate possible in-group favoritism that may be driven by linguistic differences between groups. For this purpose, we use data from Swiss soccer. Referees' yellow- and red-card penalty decisions are evaluated to determine the existence of systematic biases that favor teams belonging to the same linguistic area (region) as the referee or penalize teams that are not from the same area. For example, in the 2018 FIFA World Cup,

the Serbian team alleged that a German referee was biased in favor of the Swiss team. Moreover, the Football Association of Serbia claimed that there was a linguistic bias in the following statement: “We are not clear how the German referee could have been appointed for the match between Switzerland and Serbia, when it is well known that one of Swiss confederation cantons is a German canton.”

Data and Results

We use data on the games from the top two Swiss soccer leagues (Super League and Challenge League) between the 2005/06 season and the first half of the 2017/18 season. In any game, the referee may share the same linguistic area as one, two, or none of the teams. For each season, we compare within each referee for each season the number of yellow cards he assigns to teams from his linguistic area to the number of cards assigned to teams from a different linguistic area.

Controlling for different measures of teams’ strengths, attendance and other game characteristics, we find that the difference in the number of assigned yellow cards between the away and the home teams is 0.33 greater when the home team shares the same linguistic area with the referee compared to when the away team does. The results are somewhat similar when dividing the data into referees from the French- and German-speaking areas.

We also find that the results for in-group bias are more pronounced in the more prestigious Super League than in Challenge League, which is the second division in the Swiss Soccer. The possible reason for such a difference is that in-group bias is stronger for higher-status competitions (Sandberg, 2018; Mullen, Brown and Smith, 1992). More specifically, we find that, only in the Super League, away teams receive approximately 0.1 red cards more when a referee is from the home team’s linguistic area, compared to when the referee shares a linguistic area with the away team. This result amounts to as much as one-third of the standard deviation of the away teams’ red cards, which is not negligible. Furthermore, only the Super League’s away teams achieve approximately 0.14 fewer points per game when the referee is from the linguistic area of the home team than when referee is from linguistic area as both or neither of the teams. This seems to be economically sizable, especially in a tight league in which teams may finish the season with the same number of points, meaning that any difference may have serious financial consequences for the teams (such as relegation to a lower division or nonparticipation in the European cups).

Conclusion

Overall, our results suggest that linguistic discrimination is a concern, with immediate implications for the design of Swiss soccer tournaments, as well as general anti-discriminatory

policies. Therefore, it is crucial that decision-makers are aware of this problem, as proper feedback training to evaluators may reduce bias.

The impact of the video assistant referee (VAR) at the conversion rates of penalty kicks in the highest leagues of professional football

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Introduction and theoretical background

The introduction of the Video Assistant Referee (VAR) to the Laws of the Game in 2018 (IFAB, 2018) introduced a new element to football in general and also to penalty kicks more specifically. VAR enables referees to correct “clear and obvious errors” through the principle of “minimum interference - maximum benefit” (IFAB, 2018). A penalty kick decision is one of the four events at which the VAR can interfere. Once a penalty was given in the pre-VAR era, it could not be reversed. The player taking the subsequent penalty could take it relatively quickly after the referee blew his or her whistle. However, since nowadays every penalty kick decision is always replayed by the VAR and also quite often officially reviewed (see Spitz et al., 2020), the time between the initial decision by the referee and the actual penalty kick has increased substantially. This introduced a new element for the players taking the penalty kicks, because they now have more time to think about their subsequent penalty kick than before the introduction of VAR. Psychological insights have suggested that people experience feelings of dread when they have to wait longer for nerve-racking events (Loewenstein, 1987), and that the outcome is considered less satisfying the lengthier the wait for such an unpleasant event (Berns et al., 2006). Jordet and Hartman (2008) found support for these notions as penalty takers were showing more hastening behavior when their team was behind in a penalty shoot-out, and that this behavior was negatively related to penalty conversion rates. The demonstrated hastening behavior illustrates thus that people experience feelings of dread when they have to wait longer for a certain nerve-racking event, because the players choose to “get over with it quickly” due to the stressful nature of a penalty (Jordet & Hartman, 2008, p. 451; see also Berns et al., 2006). Likewise, in a study on speed skating it was demonstrated that a 1 second extra delay in the ready-go interval resulted in significantly slower finishing times on the 500 meter races for both women and men (Dalmaijer, Nijenhuis, & Van der Stigchel, 2015, 2016). Nonetheless, one could also assume that longer waiting times result in more accurate decisions and tradeoffs for certain penalty kick strategies, following the dual-process models of cognition (Kahneman, 2003). Essentially, the cognitive processes of human beings can be divided into ‘System 1’ and ‘System 2’ thinking (ibid). System 1 works fast, automatically and intuitively, while System 2

is more slowly, regulatory and emotionally neutral in nature (Frankish, 2010; Kahneman, 2003). We can therefore assume that System 2 thinking will generally come into play more often once players have more time to think about their penalty kick, resulting in more rational decisions and hence a higher likelihood of a positive outcome of the penalty. Therefore, it remains unclear how the introduction of the VAR and the corresponding increased waiting times for the kickers has impacted the conversion rates of penalties in professional football. The main aim of this study is thus to examine how the time-interval between the foul leading to a penalty and the penalty kick has impacted the conversion probability of penalties in professional football. This study contributes in an important way. Any significant impact of the waiting times on the conversion rates of penalty kicks would signify an unintended effect of the VAR, while it was implemented for more fairness and should thus take on a neutral role. If increased waiting times result in lower conversion rates, it means the VAR unintentionally disadvantages penalty takers. Increased waiting times leading to higher conversion rates instead would have broader consequences, because that means every penalty taker should consider taking more time.

Methods

We use data on all the 2,888 penalties awarded in the Premier League (England), La Liga (Spain), Bundesliga (Germany), Serie A (Italy), the Eredivisie (The Netherlands) and the UEFA Champions League, over the course of the seasons 2015/2016 up and until 2019/2020. Gracenote Sports provided us with these data, as well as information on a wide range of situational (e.g. current score, match location) and individual (e.g. position, footedness, age of the kicker) factors related to a penalty. The main variables of interest concern the exact time of the foul, the exact time of the penalty, binary information on whether the video assistant referee was consulted, and the outcome of the penalty (scored/missed). Especially the exact time variables and dummy variable regarding the VAR-intervention are unique pieces of information, that have not been used in this way before. The independent variable of the current study is computed by subtracting the time of the foul that causes the penalty (in sec.) from the time when the penalty is taken (in sec.). This results in a variable ranging from 31 to 518 seconds, indicating the waiting time between the foul and the penalty ($M = 82$). Logistic regression analyses are employed because our outcome variable is binary (0 = penalty missed, 1 = penalty scored). First, we bivaritely examine if the time-interval between the foul and the penalty has an effect on the outcome of the penalty. Then, we proceed with a multivariate model in which we examine, based on preliminary analysis and previous research, more extensive specifications. We included, in addition to the time-interval, also the var-intervention dummy, the different seasons and competitions as dummies, the current scoreline, whether it was a home

penalty, whether the match was played in an empty stadium, whether the kicker was the one getting fouled on, whether the kicker was a substitution, and his age of the kicker.

Findings

The bivariate logistic regression model shows that the time-interval between the foul and the penalty does not significantly predict the outcome of the penalty kick, hence whether the penalty resulted in a goal or not ($b = 0.10$, $z = 1.77$, $p = 0.08$). However, the waiting time may be correlated with other factors determining the outcome of a penalty kick. Hence, we examine more extensive specifications. This multivariate model shows an interesting and somewhat surprisingly result. The waiting time variable coefficient is still positive and insignificant, while the VAR-intervention dummy induces a significant negative effect on the outcome of the penalty instead ($b = -0.45$, $z = -2.42$, $p = 0.015$). This effect remains after controlling for the differences in conversion rates for the various seasons and competitions in the sample, and also after taking into account all other relevant factors (i.e. the current score, home-team penalty yes/no, if the fouled player takes the penalty, age of the kicker and whether or not the kicker was a substitution). Following the effect sizes of this model, we calculated the predicted probabilities for scoring a penalty kick for a certain penalty in which a var-intervention was conducted versus a penalty kick in which no var-check was needed. The conversion probability of a penalty kick with a var-intervention is 0.73, and the probability without a var-intervention is 0.81. Thus, the effect is an 0.08 decrease in conversion probability when the video referee intervened with the referee decision to award a penalty. An additional model with the exact same parameters but only for the matches which had video referee checks available ($N = 1,133$) showed the same results. The insignificant effect of the waiting time and the significant negative effect of the var-dummy both remain, and the effect size even of the var-intervention even increased ($b = -0.53$, $z = -2.52$, $p = 0.012$). This further supports the finding that it is not the time between the foul and the penalty that impacts the conversion rates, but whether or not the video referee intervened with the referee decision to award a penalty. This negative effect of the VAR on the conversion probabilities of penalty kicks signifies an unintended effect of the introduction of the video referee in professional football. The VAR was implemented with the goal of “minimum interference - maximum benefit” (IFAB, 2018) to correct obvious errors by the referees. It was thus implemented for more fairness in the game. However, the negative effect of the var-intervention in this study implies that the VAR unintentionally disadvantages penalty takers.

Session VI: Sport Finance

Wednesday, 25 August, 19:00 CEST

Supporter Crowdfunding –The Implicit Role of Fan Loyalty and Trust

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Research Question

This paper is based on findings from the author's doctoral study analyzing the potential of crowdlending and crowdinvesting in German football. The main research questions asks whether fans, who are associated with the club due to their loyalty, could become financing partners and what would be the drivers for their investment decision (intrinsic, extrinsic, other-orientated, self-orientated). By applying Commitment-Trust Theory, this study examines the antecedents of supporters' behavioral intentions to invest and their effect on the key mediating variables of Fan Loyalty and Trust. The results of the structural equation modelling will be presented in the paper with a particular focus on the two mediators and their influence on the determinant variable.

Theoretical Background

The Commitment-Trust Theory established by Morgan and Hunt (1994) builds the theoretical foundation for this research. It is a frequently cited theoretical framework and has been applied throughout different areas of research. It is suitable for this paper as Commitment-Trust Theory is an important component of relationship marketing and tries to explain long-term relationships. Hence, it can be applied to the relationship between a football club and its supporters. Various studies have shown that relationship marketing is important for this context and sports in general (Bee and Kahle, 2006; Bühler and Nufer, 2012; Kim and Trail, 2011; Wang, 2020). To analyze the potential of supporter crowdfunding and fans' willingness to invest, the original model from Morgan and Hunt (1994) has been adopted as suggested by several studies which are related to this topic from non-profit organizations (MacMillan et al., 2005), e-commerce (Cui et al., 2020; Akrouf & Nagy, 2018) and crowdfunding (Ryu and Kim, 2016).

In the following the two key mediating variables should be considered in more detail. Trust was applied as proposed in the original model, however, Commitment was replaced with Fan Loyalty within this study. The rationale for this modification is explained below.

Fan Loyalty

The importance of commitment in relationship marketing is undoubted, however, there is no agreement on the conceptualization and operationalization of the construct (Klein et al., 2014). Overlaps between commitment and loyalty are outlined by various scholars (Assael, 1987; Beatty and Kahle, 1988), in particular also by Morgan and Hunt (1994). Cater and Zabkar (1994) showed in their review that loyalty is the more complete measure of commitment. Given the importance of loyalty in the sports context Chung et al.; 2019; Hart, 2017; Yoon et al., 2017), the decision was made for this study to use Fan Loyalty as key mediating variable.

Trust

Trust is a multi-disciplinary construct which was defined by Friman et al. (2002, p. 405) as “the willingness to rely on an exchange partner in whom one has confidence.” It expresses an expectation about honesty and benevolence (McKnight & Chervany, 2001; Zainal, Harun, & Lily, 2017). Especially in online settings, such as crowdfunding, trustworthy behavior seem to be crucial for the relationship success. It is also inherent to charity and fundraising and to the relationship between clubs and its fans. Therefore, the concept seems to be very appropriate for this research.

Methodology

A quantitative research design was chosen for this part of the study. An online survey was conducted in 2018. The key demographic indicators of the collected sample of 1.213 of which 712 were fully completed responses, represents a 59 % full completion rate. This data was analyzed using confirmatory factor analysis (CFA) and structural equation modelling (SEM) within a multi-model approach, while using the software packages SPSS and AMOS.

Results

Among three rival models, the partial-mediating model was able to explain 81.4 % of the variance of the sample data. According to the results, the key driver for supporters' Willingness to Invest is the intrinsic, other-orientated motivation called Perceived Meaningful Contribution. The goodness-of-fit index CFI = .980 indicates an excellent model fit. Even the badness-of-fit index RMSEA with .041 shows an excellent fit of the data to the conceptualized model.

However, the most surprising result was that the two mediating variables Fan Loyalty and Trust does not seem to be important for the determinant variable. Trust is even more unimportant than Fan Loyalty. This is also supported by the analysis of the indirect effects where only very minor values were calculated. Additionally, the relationship between the two

mediators Trust and Fan Loyalty is insignificant. This finding will be considered in more detail in the discussion.

Discussion

Although the statistical results of this study showed that Trust has little power in its association to Fan Loyalty and Willingness to Invest, this does not mean that Trust is unimportant. Compared to many studies on trust in the context of online transactions, a physical relationship between the football club and the fan already exists. It is not just the virtual interaction (Kim & Peterson, 2017; Mukherjee & Nath, 2007). Thus, the fan trusts or does not fully trust the club anyway and has an established relationship with the organization (e. g. attending matches, buying merchandise). As in personal relationships, in particular in the long term, trust may be implicit and acts as an assumed value (such as in a long marriage as often cited in the literature on Trust).

Similarly, the second mediator – Fan Loyalty – is also not significant to the output variable Willingness to Invest. This result suggests that Fan Loyalty neither has a positive nor a negative impact on the output variable. That is inconsistent with existing Commitment-Trust Theory (Morgan & Hunt, 1994), however, it could – just as Trust – be implicit in the relationship.

Conclusion

The structural equation modelling suggests that the intrinsic, other-orientated motivation was the most important driver for supporters' willingness to invest in a crowdlending or crowdfunding campaign of a football club. Although the two key mediating variables Trust and Fan Loyalty does not seem to be important, the overall model would result in lower model fit statistics without those two variables. This provides an indication that both factors need to be important somehow. Within this discussion, the author raises the question whether trust and fan loyalty may be implicit in the relationship such as in a long-established personal relationship. This idea could be analyzed further in ongoing research.

Sport and cultural events: willingness to pay, facial expressions and skin response

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Introduction and motivation

The topic of this particular study is to combine both facial expressions, skin response and willingness to pay (WTP) using an iMotions Platform. This software solution combines biosensors in human behavior research. The WTP is first investigated by paper and pen and then the respondents watch a video that contains different music performances and sport events. To the knowledge of the author, no such study of the relation between willingness to pay and biosensor data.

Galvanic skin response (GSR), also known as electrodermal activity measures electrical activity conducted through sweat glands in the skin. It is an indication of the intensity of an emotion experienced (iMotions). GSR is an indication of stress (arousal of the sympathetic nervous system) in the body by appearing as continuous variation in the electrical characteristics of skin (De Brito, Mitchell 2019). Increased skin conductance is associated with higher mental load and/or stress (Epps 2018). The measurement of emotional expression may include different physiological or neural parameters, such as galvanic skin response, heart rate, blood pressure, stomach contractions or dilation of blood vessels (Mainwaring 2011). In the sport context, GSR is common, however mainly in coaching and sport science. High impact sport exercising is related to heart rate level and heart rate variability (Tulppo, Mäkikallio et al. 1998). GSR in relation to music has been studied somewhat (Berger, Turow 2011).

Facial expression analysis uses webcam to synchronize expressed facial emotions with stimuli directly using a software. An important standard for measuring emotional facial expressions is the Facial Action Coding System (FACS) by Ekman and Friesen (1976). Automated facial expression analysis uses several observable action units that account for facial expressions and in turn for the expression of emotions. The iMotions platform and software classifies emotions into seven categorical emotions: joy, anger, surprise, fear, contempt, sadness and disgust. A recent review article by Teal, Roberts, Harrigan, Clarkson and Rosenberg (2019) shows that emotions have an important component in pertaining sport sponsorship. Emotions have an impact on intentions and purchasing behavior. Facial expressions are generated by contractions of facial muscles, which results in facial features such as eyelids and eyebrows, nose, lips and skin texture (Fasel, Luetttin 2003). The muscular

activities changes are brief, usually less than 5 s but more than 250 ms. Facial expression intensities can be measured by determining the geometric deformation of facial features or the density of wrinkles appearing in certain face regions. The iMotions platform algorithm, Affective AFFDEX uses head orientation (yaw, pitch, roll), interocular distance and 34 facial landmarks and based on these the algorithm classifies seven categorical emotions mentioned above and besides these also valence, engagement and attention. 14 facial expression metrics are calculated.

Soccer teams with displaying both anger and happiness were positively correlated with team performance in the World Cup. Teams with more anger, emotion associated with competitiveness, concede less goals and teams with more happiness, emotion associated with confidence, score more goals (Hopfensitz, Mantilla 2019). However, the results should not be interpreted as teams whose players are angrier or happier perform better since the reverse might be more plausible: performing better leads to angrier or happier faces.

	Jazz music concert	Aesthetic Group gymnastics	Ice Hockey	Classical music concert	Athletics	Rock music concert
0, not interested						
5€						
10€						
15€						
20€						
25€						
30€						
35€						
40€						
45€						
50€						
More than 50€, how much?						

Figure 1.

Moreover, the student's age and gender are collected through official records. After having filled the questionnaire, the students watch a video that contains eight different parts, each lasting about one minute. The first is Pekka Pohjola's "First morning" a classical fusion jazz piece of music. Despite that, the album where First morning is included was chosen as the best album of the year by national broadcasting company Yleisradio, probably the students in sample have not heard it before. However, it was not asked. There was no visual content in the video except the album sleeve. The second video clip contains aesthetic group gymnastics, the performance of Minetit, which is the Finnish champion in 2019. The performances in aesthetic

group gymnastics are very beautiful but difficult. Most Finns do not know the sports. Based on the author's opinion the audience in aesthetic group gymnastics competitions is made up of solely persons who are relatives of the gymnasts or who are exercise gymnastics themselves. The third video clip contains some moments of the crucial ice hockey game where two Finnish teams (HPK from Hämeenlinna and Tappara from Tampere) were competing on purpose to be the champion of the season 2018 – 2019. Usually Tappara is considered stronger since it has more financial resources and a better recent record in ice hockey, however, HPK won the game. The fourth video clip is classical music, Karelia by Sibelius. The only visual content is merely a birch forest view with no dynamics. The music was composed in 1893 and well known throughout the whole Finland. The fifth clip contains a pole vault attempt by a female Finn, Minna Nikkanen. She actually passed the bar at the height of 456 cm, which was its time in 2015 the Finnish record. The sixth clip contains punk rock or alternative rock music "Rappiolla" by Hassisen kone. The hit was published in 1980 and it is very popular still today. The video clip contains only black record and no dynamic visual content. The seventh video clip contains a famous music by Lasse Mårtensson: "Myrskyluodon Maija". In the 1970's a television series with the same name was broadcasted. The music in the series was published in 1977. The video clip contains first symphony orchestra version of the music and soprano Karita Mattila singing but during the clip, the performance totally changes to Apocalyptica, which is a Finnish symphonic metal band. The last video clip contains the last minute of the 5000 m Olympic competition in 1972 at München, Germany where a Finn, Lasse Viren won the competition. The overall length of the video is about 8 min and 22 sec.

The iMotions platform uses artificial intelligence and classifies facial expression into seven categorical emotions: joy, anger, surprise, fear, contempt, sadness and disgust. The algorithm uses automated facial coding engine called AFFDEX. The facial action coding system (FACS) refers to a set of facial muscle movements that correspond to a displayed emotion (iMotions). Using the system, we are able to determine the displayed emotion of the participant. Affectiva AFFDEX monitors head orientation (yaw, pitch, roll), interocular distance and 34 facial landmarks. The other module of the platform is GSR. The logic behind GSR is simple: place two electrodes on emotionally sensitive body locations, apply a constant low voltage, measure the electrical current between the two electrodes and get the associated skin conductance. The palms of the hands, fingers and foot soles are sensitive recording sites. GSR activity is typically measured in μS (micro-Siemens).

The original GSR signal can be decomposed into a) duration from stimulus, b) peak amplitude, 3) rise time and 4) recovery time.

In this particular study, the sites are fingers but only the heartbeat level and variation are used individually in each eight video clip, since in emotional situations bodily processes are triggered automatically: the heart beats faster, the pulse rises and hands become sweaty.

Results

Joy and surprise as facial expressions seem to relate with willingness to pay. The other emotions do not seem to relate.

The monetary value of sport participation and volunteering: The wellbeing valuation approach

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Introduction

In recent years, the focus of sport policy and research has shifted from the mere assessment of tangible, economic impacts of sport to a broader assessment including also intangible and non-economic impacts (Orlowski & Wicker, 2019). Social return on investment (SROI) analyses have emerged which consider social and health effects of sport participation and volunteering in addition to economic and consumption-related effects (Davies et al., 2019). Because of their intangible nature, identifying appropriate monetary values for the benefits obtained from participating in activities like sport and volunteering that reflect the overall value of these activities to individuals is challenging. For example, individuals do not only generate direct use values from engaging in an activity, but also indirect use values such as health and social effects (Orlowski & Wicker, 2019). Hence, using any prices of sport participation (e.g., membership or entrance fees, clothing) or the opportunity costs of volunteering in terms of foregone income in individuals' normal occupation would not fully capture the value of these activities to individuals. Also, the latter approach assesses the input of individuals rather than the benefits they obtain.

To address these issues, the wellbeing valuation approach, or compensating variation approach, has emerged in recent years (for an overview see Orlowski & Wicker, 2019). Its general idea is to estimate the contribution of different factors of interest to individuals' subjective wellbeing (SWB) and assign monetary values by estimating compensation payments. In the case of a wellbeing-enhancing factor, the compensation payment reflects how much income individuals would be willing to forego that they can still enjoy the factor of interest while retaining their current level of wellbeing.

The purpose of this study is to investigate the effects of sport participation and volunteering on individuals' SWB and assign monetary values using the wellbeing valuation approach. Specifically, this work considers that SROI models require values per hour rather than any frequency measures. It examines different dimensions of SWB rather than only one general SWB measure. The following three research questions are advanced: (1) what is the relationship of sporting and volunteering hours with different SWB measures? (2) What is the

monetary value of one sporting hour and volunteering hour using the wellbeing valuation approach? And (3) how do the monetary values differ depending on the type of SWB measure employed and the type of model? The contribution of this work lies in the estimation of hourly values and the comparison of these values for different SWB measures and estimators. It is among the first to employ the wellbeing valuation approach to volunteering.

Theoretical background and literature review

Subjective wellbeing (SWB) is referred to as individuals' affective and cognitive evaluations of their lives. It encompasses four separable components such as a global life satisfaction, satisfaction with important domains in life, high levels of positive affect and low levels of negative affect (Diener, 2000). The focus of this study is on global life satisfaction and satisfaction with different life domains, including health, work, income, and leisure time. Previous studies focused on global measures of life satisfaction (e.g. Huang & Humphreys, 2012; Wicker & Downward, 2020; Wicker & Frick, 2017) or happiness (e.g. Downward & Dawson, 2016; Pawlowski et al., 2014; Ruseski et al., 2014). Only a few studies considered satisfaction with other domains in life (e.g. Wicker et al., 2020).

From a theoretical perspective, individuals engage in activities that enhance their wellbeing, while trying to reduce their participation in wellbeing-reducing activities (Wicker, 2020; Wicker & Thormann, 2021). Individuals participate in sport and volunteering for a number of reasons. The underlying theoretical mechanisms through which these activities yield SWB were summarized by Wicker (2020) for sport and by Wicker and Downward (2020) for volunteering. Common mechanisms for both activities include enjoyment (Frey, 1997), health (Lera-Lopez et al., 2017), social interactions (Downward et al., 2018), relational goods (Becchetti et al., 2008), distraction from problems and stress, and increased self-esteem and self-efficacy (Lehnert et al., 2012). Drawing on the literature on pro-social behavior, additional mechanisms such as altruism (Becchetti et al., 2008) and generosity (Lane, 2017) can be identified for volunteering.

From an empirical perspective, existing research has documented a positive and causal effect of sport participation on SWB (e.g. Huang & Humphreys, 2012; Ruseski et al., 2014). A few studies have assigned monetary values to sport participation by employing the wellbeing valuation approach (e.g. Orłowski & Wicker, 2018). For example, an extra minute of sport per year was valued at £215 (Downward & Rasciute, 2011) and £110 (Downward & Dawson, 2016). For volunteering, existing research has documented a positive and causal effect on SWB for general measures (e.g. Becchetti et al., 2008), while a distinction between different voluntary roles yields inconsistent effects (Wicker & Downward, 2020). Monetary values for

volunteering were mainly obtained using other valuation approaches relying on opportunity costs (Orlowski & Wicker, 2015; Solberg, 2003), replacement costs (Davies, 2004; Vos et al., 2012), or societal benefits (Orlowski & Wicker, 2016).

Methods

This study uses data from the German Socio-Economic Panel (GSOEP), which is a yearly survey of the German resident population conducted by the German Institute for Economic Research. The present study uses data from the 2017 wave of the GSOEP because this is the first and only wave where hourly measures for both sport participation and volunteering are available. Previous GSOEP waves only included ordinal frequency measures for both variables. The sample consists of $n=30,861$ respondents.

SWB is measured with a general life satisfaction measure and four variables capturing satisfaction with specific life domains including health, work, household income, and leisure time (from 0=completely dissatisfied to 10=completely satisfied). The independent variables of interest are the number of sporting hours and volunteering hours per month. The latter is a general volunteering measure as voluntary coaching in sport is a too rare event in the data. The study also includes their squared terms to control for possible non-linear effects of both sport (Wicker & Thormann, 2021) and volunteering (van Willigen, 2000; Windsor et al., 2008). Income is measured as the monthly net equivalent income. Control variables are gender, educational level, children, marital status, and employment.

The empirical analysis consists of four sets of models: Linear models without and with squared terms for sporting and volunteering hours; seemingly unrelated regressions (SUR) as the outcome variables are correlated; and instrumental variable (IV) estimates that consider the endogeneity of sporting and volunteering hours (only for satisfaction with life, work, and income). All models were estimated with robust standard errors.

Results

The OLS models show that sporting hours and volunteering hours are positively associated with all SWB measures – except for the effect of sport on work satisfaction. The models including squared terms indicate diminishing returns for both activities, again with the former exception. The SUR models support the diminishing wellbeing returns for sporting hours for all five outcomes except work satisfaction. Diminishing returns for volunteering are evident for life and leisure time satisfaction, while the effect on work satisfaction is positive. The initial IV models reveal positive and causal effects for sport on life satisfaction, work satisfaction, and satisfaction with household income, while volunteering is insignificant. The obtained monetary values vary depending on the outcome variable and the employed estimator.

Session VII: Performance I

Thursday, 26 August, 15:00 CEST

Dispersion in (UN)Explained Pay and On-Field Team Performance: The Case of Italian Serie A

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Introduction

Over the past decade, researchers extensively explored the issue of pay dispersion and its potential effect on organizational performance in labor and personnel economics (Kahane, 2012). Nevertheless, the resultant relationship between pay dispersion and organizational performance is mixed in the literature, with either a positive or a negative pay dispersion–organizational performance relationship in several settings (Gupta & Shaw, 2014). Numerous studies look at different contexts of professional sports to investigate the impact of player salary dispersion on team sporting success (e.g., Bloom, 1999; Coates et al., 2016; Franck & Nüesch, 2011; Simmons & Berri, 2011). Unsurprisingly, empirical evidence supports both the positive (Simmons & Berri, 2011) and negative relationships (Bloom, 1999; Coates et al., 2016). Furthermore, both insignificant (Buccioli et al., 2014) and linear relationship (Franck & Nüesch, 2011) has been uncovered in professional soccer, adding complexity to the research topic.

The majority of the literature on the effect of salary dispersion on team performance in several professional sporting contexts examines *unconditional* pay dispersion, which is “computed without considering the differences across workers within a firm” (Kahane, 2012, p. 166). Under this empirical strategy, however, the effect of pay dispersion legitimating individual (player) inputs tends to be canceled out (Shaw, 2014). In contrast, Shaw et al. (2002) advanced the literature by proposing the concept of explained pay dispersion, which is based on inputs related to productivity. The authors asserted that explained pay dispersion is positively related to organizational performance. Empirical studies provided evidence supporting this assertion (Trevor et al., 2012). The purpose of the proposed study is to expand the method of explained pay dispersion to explore the relationship between pay dispersion, productivity, and team performance.

Proposed Methods

After considering different specifications of playing squad and choices of dispersion measure (Simmons, 2018), the proposed study uses a panel data of the Italian Serie A from the 2013/14 to 2018/19 season ($n = 120$) to register the effect of within-team player salary dispersion on team sporting success in the league. We conduct the proposed study by separating

teams into two parts: 11 players with the most starts and 18 players with the most appearances in one season. Instead of focusing on the entire team roster, our analyses focus on active players (Buccioli et al., 2014; Katayama & Nuch, 2011), who contribute the most to match outcomes. For the measure of salary dispersion, we use the method developed by Trevor et al. (2012). This empirical approach is consistent both in the professional team sport setting (i.e., the National Hockey League) by Trevor et al. (2012) and beyond the sport setting (Grabner & Martin, 2021). We first estimate the following salary equation conditioning on player input:

$$Y_{it} = AP_{it-1} + BX_{it} + \varepsilon_{it}, \quad (1)$$

where Y denotes player salary (logged) in season t and P is a matrix of values from the performance-based input (i.e., individual player rating) from year $t-1$. X , a matrix of year dummies, captures the season fixed effects. ε is an error term reflecting the residual for player i in season t .

Then, we disaggregate salary dispersion into *dispersion in explained pay (DEP)* and *unexplained pay (DUP)*. Derived from Equation 1, *DEP* denotes the variance of the predicted values, while *DUP* is the variance of the residual terms. We then regress individual teams' on-field performance on salary dispersion measures and their quadratic terms along with other controlling variables as follows:

$$P_{it} = \beta_0 + \beta_1 AvRating + \beta_2 ReSalary + \beta_3 ReSalary^2 + \beta_4 CoachWinPct + \beta_5 MidChange + \beta_6 DEP + \beta_7 DEP^2 + \beta_8 DUP + \beta_9 DUP^2 + \gamma_{it}, \quad (2)$$

where P_{it} is a measure of team i 's performance during season t , end-of-season points, and rank in the league standing. The main variables of interest are the linear and quadratic terms of explained and unexplained salary dispersion (*DEP* and *DUP*) obtained from the previous step. In terms of the explanatory variables, we use team-level average player rating in a particular season to represent player input (*Avrating*). Moreover, we proxy team non-player inputs for *ReSalary* and *ReSalary*², representing the ratio of team i 's total payroll to the league average and its quadratic term in the observed seasons. We also control for the managerial factors by including a coach's career winning percentage prior to the beginning of the observed season (*CoachWinPct*) and an indicator variable, mid-season coach change (*MidChange*), equal to 1 if the incumbent coach is replaced during the season. γ_{it} captures the influences of other unobserved error terms. We estimate Equation 2 using ordinary least squares (OLS) with both team and year fixed effects.

Preliminary Findings

Based on the initial estimations, the effect of salary dispersion on team performance is contingent upon team composition. When the team is comprised of 11 players with the most

starts, the relationship between explained dispersion and team performance is U-shaped. In contrast, Trevor et al. (2012) found a curvilinear effect of *DEP*. Interestingly, our finding of the nonlinearity of the salary dispersion–team performance relationship is consistent with Franck and Nüesch’s (2011) conclusion, despite the differences regarding dispersion measurements and team compositions in these two papers. Furthermore, the estimated coefficients of *DUP* from our regression models are statistically insignificant, identical to Trevor et al.’s (2012) outcomes. When the teams are comprised of more players (i.e., 18 players with the most appearances), however, the result is different. In other words, neither *DEP* nor *DUP* affects sporting success in our sample.

The proposed study provides further empirical evidence concerning Shaw’s (2014) argument that explainable pay dispersion is generally related to improved team performance (despite the initial negative trend in our sample). Furthermore, our early results confirm the importance regarding the definitions of team and measures of dispersion (Simmons, 2018) when using sporting data to investigate the relationship between salary disparity and on-field performance.

Into Thin Air: Team Composition and Team Performance in Himalayan Expeditions, 1990-2019

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Research Question

Although organizational activities are typically characterized by the fact that (at least some) people work together as a team, it is often quite difficult to structure teams efficiently. Which factors determine the success of a team in a high-stake situation? While diversity with respect to e.g. culture has often been identified as a crucial issue here, its consequences can hardly be predicted from a theoretical perspective: On the one hand, a culturally diverse team may possess a broad variety of complementary skills thus compensating for each other's weaknesses. On the other hand, heterogeneous teams may suffer from intra-group conflicts and higher communication demands due to reduced levels of implicit mutual understanding.

In this paper, we contribute to the cultural (and linguistic) diversity literature by studying team arrangements in an "atypical" organizational setting. This is important, as the nature and type of teams are different in situations that can be considered "extreme". We use unique archival data retrieved from the "Himalayan Database" – an almost complete census of all expeditions to the Nepalese Himalayan region – including detailed information on more than 4,000 commercial expeditions. While diversity should not have any significant effects when teams complete rather ordinary or trivial tasks, more challenging and complex problems require a high level of task interdependence and member interaction in order to succeed. Hence, negative diversity effects on team interactions are most likely to have severe consequences in exceptionally competitive and high-pressure contexts. Our results, thus, have implications for members of different kinds of high-stakes teams. Controlling for a large number of individual- and context-level characteristics, we find the probability of team success to be positively influenced by the cultural heterogeneity of its members.

Data

The data used in this paper is drawn from an almost complete census of all expeditions to the Himalayas (Salisbury & Hawley, 2011). In total, the database covers a time span of more than 100 years (1905-2019) and comprises some 75,000 climber-expedition observations from nearly 10,000 expeditions to more than 300 peaks in the Nepalese Himalayan region. The climbers include paying tourists, leaders, organizers, Sherpas, and high-altitude porters. In our

analyses, we use data from the “commercial mountaineering phase” that started in 1990 when elite climber Rob Hall (one of the victims of the tragedy that led to the title of our paper) arranged the first organized expeditions for Alpine tourists. His aim was to give even amateur climbers and adventurers the chance to summit the world’s highest peaks guided by a professional leader and supporting Sherpas. Mountaineering has become an increasingly popular activity since then. Since other experienced mountaineers followed to make the Himalaya accessible for everyone, competition among organizers increased.

Our main explanatory variable of interest is the cultural and/or linguistic composition of an expedition team. We include in the calculation of our diversity measures, first, only paying “tourists” and , second, tourists as well as leaders and support members due to their specific human capital endowments and their indispensable function within the team. The second data set and the ensuing estimations serve as a robustness check for the results presented below.

We use the Global Leadership and Organizational Behavior Effectiveness (GLOBE) study, which is commonly used by organizational and management scientists to conceptualize cultural value differences between nationalities. The GLOBE framework suggests nine dimensions, on which countries can be different from each other: Assertiveness, uncertainty avoidance, power distance, institutional collectivism, in-group collectivism, gender egalitarianism, future orientation, performance orientation, and human orientation. According to the countries’ scores for each of these dimensions, they are grouped into ten cultural clusters: African, Anglo, Confucian, Eastern European, Germanic, Latin American, Latin European, Middle Eastern, Nordic and Southeast Asian. The majority of the team members come from the Anglo culture followed by Southeast Asian and Germanic, while Middle Eastern and African are the least represented cultures (with respect to language, the operationalization is much easier).

We operationalize cultural diversity using the Blau index (1977), which denotes the probability that two randomly selected individuals belong to different categories.

Findings

It appears from Tables 1 and 2 that linguistic as well as cultural diversity has a statistically significant and positive impact on the share of members reaching the respective summit. All control variables have the expected sign and are mostly statistically significant too.

Table 1

Himalaya results 1990-2019: dependent variable is success share defined as proportion of climbers who reach summit and survive, marginal effects from 2 sided Tobit. N of paying climbers > 2.

Variable	Success share GLM	Success share 2 sided Tobit
Linguistic Diversity	0.102 (2.28)	0.053 (2.16)
Female share	-0.094 (1.18)	-0.048 (0.98)
Share of hired personnel in team	0.570 (3.16)	0.320 (2.86)
Oxygen share of paying members	1.514 (10.11)	0.873 (10.00)
Total team size	0.004 (2.08)	0.003 (1.93)
Peak height/100	-0.054 (6.14)	-0.031 (6.47)
Average age of paying members	-0.011 (3.94)	-0.006 (3.33)
Average experience of all members	0.011 (3.12)	0.006 (2.43)
N previous expeditions to peak	0.0004 (5.13)	0.0002 (3.52)
Pseudo R2		0.17
N	4376	4376

Table 2

Himalaya results 1990-2019: dependent variable is success share defined as proportion of climbers who reach summit and survive, marginal effects from 2 sided Tobit. N of paying climbers > 2.

Variable	Success share GLM	Success share 2 sided Tobit
Cultural Diversity	0.107 (2.13)	0.054 (1.93)
Female share	-0.093 (1.18)	-0.048 (0.97)
Share of hired personnel in team	0.570 (3.16)	0.320 (2.86)
Oxygen share of paying members	1.512 (10.10)	0.873 (9.97)
Total team size	0.004 (2.10)	0.003 (1.96)
Peak height/100	-0.054 (6.13)	-0.031 (6.45)
Average age of paying members	-0.011 (3.95)	-0.006 (3.33)
Average experience of all members	0.011 (3.19)	0.006 (2.47)
N previous expeditions to peak	0.0004 (5.13)	0.0002 (3.53)
Pseudo R2		0.17
N	4376	4376

Conclusion

Our findings suggest that – perhaps surprisingly – linguistic as well as cultural diversity contribute to team success in a particularly “hostile” environment. The sources of these positive effects need to be explored.

Performing best when it matters the most: Evidence from professional handball

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Theoretical background

“Choking Under Pressure” (CUP) describes performance decrements at particularly important moments in competition compared to the performance that a person can usually achieve (Ötting et al., 2020). This phenomenon is especially pronounced in crunch time, the final minutes of tight games in professional team sports (Toma, 2017).

What factors make some athletes more and some less inclined to choking under pressure? Psychological concepts can help to answer this question. Several studies analyze personality traits related to job satisfaction, motivation, and performance (e.g., Wright et al., 2004, Dudley et al., 2006; Lin et al., 2014). In this context, the concept of the core self-evaluation (CSE) has received much attention – Judge and Bono (2001) as well as Judge and Kammeyer-Mueller (2011), e.g., observe positive correlations of CSE with job satisfaction. Bühren and Steinberg (2019) were the first to analyze the effect of psychological traits on performance under pressure in sequential tournaments. In their tennis field experiment, they use an additional survey that addresses the individual self-assessment categories according to Judge et al. (1997). The authors find interaction effects of psychological traits on performance. Whereas subjects with low self-esteem face a first-mover advantage, subjects with high self-esteem perform better as second-movers. Clarke et al. (2020) examine golfers’ and archers’ personality traits connected with choking under pressure. They use a questionnaire with items on fear of negative evaluation, doubts of action, and non-display of imperfection. Comparing these results to self-reported CUP, they can classify over 70% of choking athletes based on their psychological traits.

Methods of the study

We measure performance under pressure with the shot success of penalties in the crunch time of professional handball games and compare it to the shot success of penalties thrown in the rest of the game. Similar to the penalty kick in soccer, the seven-meter-throw is a one-on-one situation between the thrower and the goalkeeper (Apestigueva & Palacios-Huerta, 2010). All other players are direct observers of this situation and cannot intervene. As the probability of a goal being scored is much higher than the goalkeeper's chance to save the seven-meter, the psychological pressure lies on the thrower’s shoulders. Sufficient time for reflection before the

throw and the responsibility for the potential success or failure of the entire team increases this pressure – especially in deciding situations of the game (Bühren & Krabel, 2019).

A synonym for the deciding phase of the game is crunch time (Christmann et al., 2018). Depending on the ball game, it occurs in the final minutes or seconds when both teams still have the chance to win and every move might turn the game into a success or defeat. In contrast, the final moments of already decided games are called garbage time (Ertug & Maoret, 2020). We categorize a penalty to be thrown during crunch time in the last 15 minutes of a handball game if the thrower's team is a maximum of four goals behind and three goals ahead. Thus, when scoring the penalty, the difference between the teams' scores is a maximum of four goals. During the second last minute of the game, we allow the score difference in crunch time to be a maximum of three goals, and during the last minute a maximum of two goals. The official homepages of the German Handball Federation, the German Handball Bundesliga, and the Women's Handball Bundesliga records all seven-meter throws (www.dhb.de, <https://www.liquimoly-hbl.de/de/>, <http://www.hbf-info.de/o.red.r/home.html>). In addition to the game data collected for the penalty throws, we use individual data of the thrower available on the same homepages.

Moreover, we assess the players' CES via a survey according to Judge et al. (2003), who use a questionnaire with 12 items. These items are assessed on a 5-level Likert scale (from strong disagreement to strong agreement) and yield very good internal consistency (Cronbach's $\alpha > 0.8$), retest reliability ($r=0.81$), and convergent validity (Judge et al. 2003). For native German speakers, the questionnaire of Brückner (2020) is used, who modified the version of Heilmann and Jonas (2010). The German version of the CES scale by Brückner (2020) shows the same very good quality criteria as the original by Judge et al. (2003) and the earlier German translation by Heilmann and Jonas (2010). Beyond CSE, we measure the individual willingness to take risks because risk-taking influences performance in general and specifically under pressure. We use the short scale of Beierlein et al. (2015). The 7-level Likert scale ranges from not willing to take risks to very willing to take risks. The short-scale has very satisfactory quality criteria (Beierlein et al., 2015). Following Clarke et al. (2020), we also ask whether the players have ever experienced a dramatic drop in performance that is beyond their control. This variable is likely to be negatively correlated to the CSE scale because relatively more self-confident people are expected to express fewer experiences with CUP – or these experiences might rather cause a person to be less self-confident. The self-assessment serves as a control variable for CUP observed in our handball dataset.

Major findings

Our findings support the idea of performing best when it matters the most. Contrary to the phenomenon of choking under pressure, we observe that penalties are scored more often in the decisive stage than in the rest of the game. This effect is especially pronounced when the score is level or when the thrower's team is lagging. While the scoring probability of female players is on average higher compared to male players, we find that the positive effect of pressure is not different by gender.

We observe no significant interaction effects between psychological traits and pressure on shot success. The reason could be that our subjects are selected to be regularly responsible for throwing penalties for their team. Thus, they are experienced and trained to perform well under psychological pressure. Whereas 63% of golfers and archers reported CUP experiences in the study by Clarke et al. (2020), only 30% remembered personal CUP in our sample. Furthermore, the average CSE of our players is higher compared to the results of Brückner (2020), Heilmann and Jonas (2010), and Judge et al. (2003). Thus, our findings seem to be particularly relevant for specialists who are used to execute a familiar task under high psychological pressure, taking responsibility for their team.

Session VIII: Demand I

Thursday, 26 August, 15:00 CEST

Demand for Esports: An Econometric Analysis of the Digital Sport Economy

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Context and Theoretical Background

To date, the esports industry has witnessed rapid expansion, with hundreds of millions of individuals participating in esports annually (Brown, Billings, Murphy, & Puesan, 2018; Jenny, Keiper, Taylor, Williams, Gawrysiak, Manning, & Tutka, 2018). Alongside this impressive growth there has also been increased attention from sport scholars, including attempts to better comprehend the place of esports in relation to traditional sport management research (Cunningham, Fairley, Ferking, Kerwin, Lock, Shaw, & Wicker, 2018; Funk, Pizzo, & Baker, 2018). At the same time, esports scholarship in the field of sport management can still be considered in its infancy, with studies often focused on debating whether esports is a sport (Hallman & Giel, 2018) or analyzing motivations for consumer/participant behaviors in esports (e.g., Pizzo, Na, Baker, Lee, Kim, & Funk, 2018; Seo, 2016; Qian, Zhang, Wang, & Hulland, 2019b). As such, within this burgeoning literature, the theoretical explanations and empirical observations of esports consumption phenomena are at present rather limited.

Against this backdrop, in this article we seek to advance this line of inquiry by taking an economic approach to the study of esports consumption. More specifically, we propose a framework for investigating consumer demand in esports by analyzing the main economic determinants of online viewing activity of esports programs and events. Surprisingly, while consumer demand is a basic concept — especially with the substantial volume of research studying the demand for sport, including research examining event viewership and consumption on digital platforms (e.g., Tainsky & Jasielc, 2014; Tainsky & McEvoy, 2012; Tainsky, Xu, Mills, & Salaga, 2016; Sung, Mills, & Mondello, 2019; Watanabe, 2015; Watanabe, Yan, & Soebbing, 2015) — it has received remarkably limited scholarly attention in esports research. Existing studies that analyzed esports through an economics lens have primarily focused on performance and the labor market for professional esports athletes (Parshakov, Coates, & Zavertiaeva, 2018; Parshakov & Zavertiaeva, 2018). Considering this, the foundation of our framework is the observation that while esports makes the shift to live streaming, broadcast platforms dedicated to gaming expand the horizon of esports through experiential and behavioral modalities (Taylor, 2018). Notably, Twitch has emerged as one of the top digital platforms for streaming esports around the world (Xiao, 2020), and has become

a major source of viewership, engagement, and income for professional esports athletes, game producers, competitions, and even amateur game enthusiasts. At any given time, there are as many as 5 million active channels streaming live video game and esports content, nearly 4 million concurrent viewers worldwide, and over 1 billion total hours of content viewing in any given month on the Twitch platform (data c. March 2020). To wit, Twitch is *the* pivotal medium through which most fans, consumers, and gamers constitute their interactive esports experiences.

Methods

In order to model factors that determine esports, this research follows guidance from previous research examining the determinants of television viewership and social media following in sport (Tainsky, 2010; Watanabe et al., 2015). Where a classic sport demand models often follow the taxonomy of factors laid out by Borland and Macdonald (2003), including economic factors, consumer preferences, quality of contest, quality of viewing, and supply capacity, there is some need for modification of this model in considering the streaming of esports. To begin with, although there is certainly need to consider economic factors, there is almost no difference in price for individuals to gain access to streams on Twitch, and thus similar to television viewership studies, we do not include a variable for price (Kang et al., 2018). Thus, we measure market potential by utilizing various proxies for the region or language in which a content is streamed in. Next, where the quality of a content is often measured through the strength of teams or uncertainty of outcome (Borland & Macdonald, 2003), it is difficult to measure the quality of streams on Twitch, as it is not always the case that a channel will be broadcasting competitive matches that provide a measure of quality. In this sense, we instead focus on quality of viewing as surrogated for factors such as seat location in a stadium (Brown & Salaga, 2018). That is, we consider the characteristics of channels that could potentially be more appealing to viewers. Finally, we include a number of measures of consumer preferences and the supply of broadcasts from each channel, and thus form the following model, where Twitch viewership is a function of the above mentioned factors that can influence demand:

$$\textit{Viewership} = f(\textit{Market}, \textit{QualityofVieweing}, \textit{ConsumerPreferences}, \textit{Supply})$$

Results and Implications

Results were estimated using six regression models using different variations of the dependent variables for viewership on the Twitch platform. Turning focus to the key variable of interest measuring economic factors of the digital economy, it was found that the number of followers an account had was positive and significant in all models at the one percent level.

This indicates that having a high level of popularity on Twitch was important in increasing viewership and falls in line with prior understanding of the attention economy where microtransactions such as following play an important role in drawing interest to media (Van Dijck & Poell, 2003; Watanabe et al., 2017). At the same time, in considering the coefficient for the *Followers* variable, the value suggests that for every increase of 10,000 followers on Twitch, channels gained about 0.3 percent more views during a month. Curiously, the coefficient for *Followers* was similar across all models, thus indicating increases in popularity through Twitch metrics generated similar increases across monthly viewership, maximum number of concurrent viewers in a month, as well as the number of hours watched by viewers.

The current research advances the examination of esports through using the framework of the attention economy to provide new insight into behaviors on streaming sites where a majority of esports viewership is conducted. Furthermore, as the examination of esports consumer behaviors in the sport literature has almost entirely been conducted by surveying viewers or participants (e.g., Pizzo et al., 2018; Qian et al., 2019a, 2019b; Xiao, 2020), this study is one of the first to analyze esports viewership through analyzing data directly collected from streaming sites. As such, the current study offers numerous contributions to advance the theoretical and empirical understanding and approaches in the study of esports. Moreover, from a theoretical perspective, esports provides an appropriate context through which to further introduce the concept of the attention economy into the sport literature. That is, in considering the results from the models within this study, it is evident that measures of popularity (*Followers*) have a significant relationship with the volume of attention that streamers are able to draw to their channel. These findings are consistent with theorizations provided by previous scholarship focused on the attention economy (Simon, 1984), which argues that the ability to capture attention will become an important resource for organizations to gain advantages within the digital marketplace (Van Dijck & Poell, 2013). The results from this research also suggests sport organizations need to carefully consider their digital strategies, especially when moving into streaming and developing synergies with esports. That is, there is the common assumption among organizations that streaming of sport and esports content will be complementary to their existing operations and resources (Adner & Kapoor, 2016). However, integrating these products within the digital realm presents vast complexities that can lead to uneven patterns of attention (Webster, 2011), and thus a decline in consumer attention, resources, as well as competitive advantage.

Fan loyalty and uncertainty-of-outcome preferences: New evidence from Major League Baseball

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Introduction

The literature on the determinants of demand and consumer behavior in professional sporting markets is extensive, and there exist numerous examples for studies that analyze issues related to the uncertainty of outcome hypothesis (UOH) (corresponding literature surveys are provided by, e.g., Schreyer & Ansari (2021), Downward et al. (2009), and Borland & Macdonald (2003).⁴ However, while empirical studies analyzing the UOH typically investigate alternative uncertainty measures as well as modelling and estimation approaches, the vast majority of previous UOH research does not account for the potential existence of differences in fan base-specific uncertainty preferences. In contrast, this paper investigates the impact of team-specific changes in game outcome uncertainty (GU) on sport demand.

In this study, we predict U.S. home team Major League Baseball (MLB) game attendance for the regular seasons from 2013 to 2016 to assess the impact of changes in teams' winning probabilities on sport demand. To this end, we use betting odds (money lines) to derive game outcome probabilities and evaluate a simple squared home team winning probability measure. Estimating linear and censored team-specific regression models, as a central result, we find substantial differences in fans' preferences for GU across teams. While some fans appear to be indifferent to GOU, some teams experience a lower game attendance for games that they will likely lose, and some teams experience attendance to consistently increase in their winning probability — hence, our study provides evidence for the existence of significant differences in fans' GOU preferences.

Data and methods

The data used in this study are collected from various sources: retrosheet.org (game-log data), seamheads.com (information on stadiums), stadiumgiveawayexchange.com (bobble head promotions), darksky.net (weather API), sportsbookreviewsonline.com (betting odds), and Mueller (2020) (team rivalries).

The original data sample comprises all 9,718 games that were played over the course of the 2013 to 2016 regular seasons. However, we discard 8 games are not played at the

⁴ Concisely, going back to Rottenberg (1965) and Neale (1964), the UOH states that fans prefer uncertain game outcomes.

corresponding home team's home stadium, e.g., due to promotions, hurricanes, and other extreme events. In addition, we drop all 221 double headers and rescheduled games, because it is not always possible to distinguish between fans who purchased tickets both or only one game of a double header, and, because we cannot distinguish between fans who bought tickets for rescheduled games before they were rescheduled. Likewise, we discard 12 games that were extended to another date. The final data sample includes observations on 9,477 games.

Table 1.

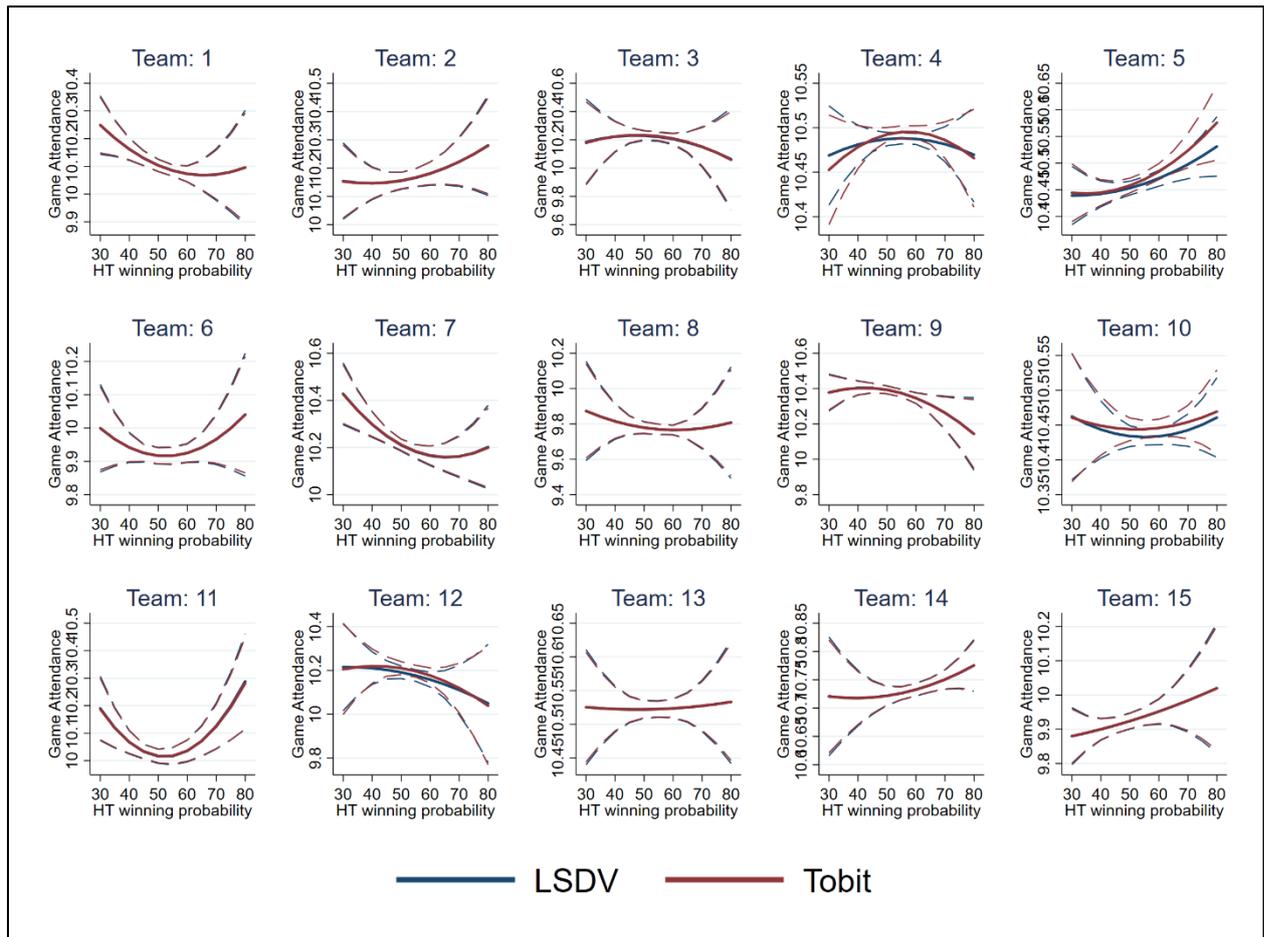
Description of explanatory variables

Variables observed in advance of a season
6 variables related to the date and time a game is scheduled
6 variables related to stadium, city, and team characteristics
5 variables related to team rivalries and specific match characteristics
6 variables related to teams' former season success
1 variable related to game promotions (bobble heads)
Precipitation during game day
4 variables related to relative team performance
Home team's winning probability (calculated from betting odds, see (Rascher, 1998))
Squared home team's winning probability

Implementation and results

We use the natural logarithm of game attendance as the outcome variable. In addition to estimating a linear regression model via LSDV, we use a Tobit regression model to account for potential censoring of game attendance by stadium capacity (here, we use the natural logarithm of stadiums' capacities). Models include year fixed effects and robust standard errors.

In Figure 1, we present the corresponding marginal effects estimates derived from the individual team-specific regression estimates. For brevity, we restrict our results to the first set of 15 out of 30 teams.



Notes: Team-specific marginal effect (ME) is computed from simple and squared home team winning probability. ME plots derived from 15 individual team-specific LSDV [Tobit] regressions. Dependent variable is the logarithm of game attendance [censored at the logarithm of stadium capacity]. Both regression model approaches account for year fixed effects and robust standard errors.

Figure 1.

Home team-specific winning probability marginal effects on game attendance

Broadcasts vs. highlights: What does a modern consumer prefer?

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Introduction

Modern information and communication technologies (ICT) provide customers a broad choice among various kinds of content and, particularly, entertainment and sports. On the Internet information almost immediately became available worldwide. Users can easily create their own content highlighting and commenting on the most important things. Thus, people can choose the most interesting content in the optimal format. It substantially increased the competition level for sports broadcasts as a kind of entertainment. Whereas attending live sports events, a consumer cannot choose the format of the product, online consumption provides opportunities for such choice.

The most popular kinds of sports were invented decades and centuries ago when life was not so intensive and fast. A match, for example, in American football lasts on average about 3 hours with less than 6% amount of action (Boss, 2013). Almost the same is for baseball. Soccer and hockey games last about 2 hours with a 40-50% amount of action (Boss, 2013). Modern consumers, who have many options of entertainment unlikely to choose, unlikely to choose the full-length broadcastings if highlights are available.

This study aims to examine the interrelation between the demand for game broadcasts and highlights for the most popular kinds of sports.

Theoretical background

For the first time, the phenomenon of digital natives and the gap between it and the generation of digital immigrants was described in the works of Prensky (2001a, 2001b). Prensky showed that people who have grown up in a world where the use of information and communications technology is pervasive and ubiquitous have different skills and think differently. For example, he notes that digital natives used to quickly getting information. Prensky and subsequent works examined the phenomenon of the digital generation primarily in the sphere of education, but it is relevant for other spheres as well.

Previous studies on demand for sports mostly ignore the highlights format (Borland & Macdonald, 2003; Buraimo, 2008; Wang et al., 2018).

Data and methodology

We use Google trends data to measure the popularity of different sports. This is a service by Google that analyzes the popularity of search queries in Google Search. This tool allows us to compare the search volume of different queries over time. We analyze the popularity of the following leagues: NFL, NBA, MLB, MLS, and NHL. We have taken league names as keywords instead of sports since they are more specific. “Football”, for example, might reflect different sports, while “MLS” reflects a particular league. Also, to be more specific, we concentrate our analysis on the US.

For each keyword, we collect 3 indicators: its search volume, which reflects the popularity of the league. We use it as a control variable. We also collect the search volume of the combination of keywords with the words “broadcast” and “highlights”, which reflect the popularity of broadcast and highlights for a given league.

We use panel vector autoregression to estimate the relationship between broadcasts and highlights popularity. This approach allows us to estimate the reaction of one variable (for example, the popularity of the broadcast) to a shock in another variable (for example, highlights popularity) in case of mutual interdependence between these variables. This method was proposed to be used in an economics context by Sims (1980), who applied it to macro-level analysis. Sims argues that VAR models provide a theory-free method to estimate economic relationships, thus being an alternative to the "incredible identification restrictions" in structural models (Sims 1980). Since the data present a panel structure, the estimation is done using panel VAR. This is an advantage since we can control for the unobservable heterogeneity between the leagues.

Results

According to the preliminary results, we find that highlights popularity negatively affects broadcasting popularity. However, broadcasting popularity positively affects the popularity of highlights.

Session IX: Careers I

Thursday, 26 August, 15:00 CEST

The Golden Age in Rowing: Has the Age of Peak Performance Changed?

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Abstract

Prior to the 1970s, the Olympics was a competition between amateur athletes, meaning that no athlete could receive any form of financial remuneration for their participation in sport. During this period, Olympic athletes could not accept any prize money, government funding or endorsements for their participation in sport, but instead had to rely solely on private sponsorship or part-time work to fund their training.

The movement away from solely amateur athletes competing at the Olympic Games started in 1972, when the International Olympic Committee (IOC) allowed athletes to receive some form of compensation for time away from work to compete at the Olympic Games (International Olympic Committee, 1972). In 1986, professional athletes were given permission to compete in Olympic sports until an official rule change allowed all professionals to compete as part of the Olympic Games in 1991 (International Olympic Committee, 1991).

In many countries, rowing at the elite level has transitioned from a part-time passion to full-time occupation where rowers are paid for their involvement and success in the sport. Many nations give additional funding to rowers who achieve high rankings at international competitions, usually by winning a gold, silver or bronze medal. Some countries have also set up training models where athletes are required to live and train in one location throughout the Olympic cycle. This is so elite level rowers can train full time in the hope to achieve the best possible result at major sporting events, such as the Olympic Games. The compensation given to athletes is seen as a substitute for a separate occupation and helps with the cost of living so that more attention can be put into training.

This paper explores how changes in the underlying rules governing a labor market and greater resource allocation to participants affects labor participation and age-productivity. We explore whether there has been a change in the average age of elite level rowers and the age at which they are successful. Following earlier research, productivity is linked to performance at competition, and peak performance is defined as winning a medal.

We also attempt to analyze if age trends have evolved differently across gender and boat class. Boat class refers to how many rowers are in a crew and how many oars each rower has. The aim of this research is to provide insight to competitors and national rowing organizations

on the age rowers are likely to peak in their physical productivity, which has implications on how resources are distributed and training models designed for sustained success.

Detailed analysis into age-productivity in sport has been conducted for various disciplines, although not for rowing. Elmenshawy, Machin, & Tanaka (2015) briefly explore aging trends in rowing, and we provide significant extensions in a broader study. Given the results of previous research on age-productivity in sport, the hypothesis is that the age of peak performance has increased for both male and female rowers.

Taking the average age of all crews that have competed as part of the Olympic Games and World Rowing Championships between 1975 and 2019, we explore aging trends and the age of peak performance in rowing. Using various summary figures and fixed-effects regression, our results indicate an overall increase in the average age and variability of peak performance. The Olympic cycle and success are also shown to have an increasing effect on the average age of rowers in the professional (1988 – 2003) and modern (2004-2019) eras, as national rowing organizations adapt their rowers training around the 4-year Olympic cycle.

For males, boat class effects have dissipated over time meaning that the average age across all boat classes is roughly the same. Females still experience some effects as the average age of smaller boat classes is older than the bigger boat classes. The increased variability of success in the modern era, especially at the Olympic indicates that a mix of youth and experience can lead to success.

Extended research could focus on age variability across each boat class to determine the ideal distribution of ages in a crew that has led to the most success. Our best estimate of when an elite level rower is likely to peak in their physical productivity is between the age of 26-30, although it is unclear whether aging trends will continue.

The Impact of Position on Salary Determination: Evidence from Major League Soccer

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Abstract

This research estimates the effects of player position on footballer salary in the context of Major League Soccer (MLS). To date, positional classification has been broadly defined, however this categorization has become increasingly outdated owing to tactical innovations in football. We expand a standard Mincer-style wage equation with indicators for precise positions as defined by the *Football Manager*TM simulation. Estimating OLS and Quantile regressions, our richer positional specification confirms that outfield players are paid a premium, but no general evidence exists to support an offensive premium hypothesis or strict salary rank-order effect. A defensive salary penalty is incurred by versatile fullbacks and those holding specific wing back positions. We show that that multi-positional players – those that can play in more than one positional zone – earn a premium. These findings bring nuance to any specialization-versatility debate as players displaying variance in a core skill (defending) incur a penalty whereas those with multiple core skills (multi-positional players) earn a salary premium. Practically, these results speak to players unions and other intermediaries that advise players on their developmental needs.

Background

Past research has considered player position as an important determinant of footballer salary. To date however, positional classification in the literature has tended to be broad. The standard approach controls for position effects in wage equations by pooling players into the generic categories of goalkeepers, defenders, midfielders and attackers/forwards (i.e. Lucifora & Simmons, 2003; Frick, 2011; Byrson, Rossi & Simmon, 2014; Deutscher & Büschemann, 2016; Carrieri, Principe, & Raitano, 2018; Celik & Ince-Yenilmez, 2017; Carrieri, Jones & Principe 2020). Position-specific skills in football have evolved significantly over the last decade however, with different positions requiring individualized skillsets and physical profiles (Baptista et al, 2018). As such, the standard positional framework has become increasingly debatable. A body of research in sports science now shows that outfield positions are fragmented and increasingly individualized (e.g. Berber et al. (2020)). A narrower set of position-specific performance characteristics is required for each unique role. In short, individual positions are now associated with alternative levels of technical skills, stature/body

shape characteristics and fitness competencies. Considering these developments, the central goal of this study is to explore the role of exact positional determinants of salaries in Major League Soccer.

The determinants of salary have attracted attention in a variety of sporting settings, with many works deriving from the seminal contribution of Scully (1974). Many important articles have emerged considering the Scully (1974) contribution that have investigated pay relative to marginal revenue productivity (Krautmann, 1999; Krautmann et al. 2000)). In general, this branch of research has involved estimating Mincer-style models to distinguish the factors causally influencing salary (e.g. (Vincent & Eastman, 2009)). While considerations of the returns to exact position have been a topic of interest to other sports, most notably the NFL (Leeds & Kowalewski, 2001; Keefer, 2013; Roach, 2018), it is yet to be explored in detail for football, that is despite the labor market in football being subject to significant attention (Frick, 2007).

To date, researchers have focused on various other contributing factors such as returns to stardom and popularity (Lucifora & Simmons, 2003; Kuethe & Motamed, 2010; Carrieri, Principe, & Raitano, 2018), footedness (Bryson, Frick & Simmons, 2013), performance (Montanari, Silvestri & Bof, 2008; Deutscher & Büschemann, 2016), citizenship (Bryson, Rossi & Simmons, 2014; Celik & Ince-Yenilmez, 2017; Medcalfe & Smith, 2018), contract length (Frick, 2011) and injury/productivity shocks (Carrieri, Jones & Principe, 2020).

Data & Method

We developed a cross sectional dataset matching the 2019 salary data disclosed by MLS Players Association with the 2019 FM database. Our dataset covers 551 players for this season. We distinguish between two forms of earnings provided by the MLSPA salary guide: base salary and guaranteed compensation (G.Comp). The FM database provides data on player position, player age, citizenship, experience (past number of MLS appearances prior to the 2019 season), proximate contract duration and player ability. This data is compiled by the developers (Sports Interactive) scouting network comprised of approximately 1,300 individuals across 50 countries (Sports Interactive, 2020).

Following previous literature, our econometric strategy involves setting up a Mincer wage equation where player earnings are modelled as a function of our variable of interest – position – and numerous controls, most importantly player ability. Our empirical strategy involves increasing the complexity of the position variable. We begin by replicating the basic positional definitions in line with past research, considering an Outfield Premium Hypothesis. We develop the basic models thereafter, using progressively richer positional measures.

We estimate ordinary least squares (OLS) models for all levels of analysis with the inclusion of franchise dummies to allow us control for unseen franchise-specific factors relevant to salary determination. We also use quantile regression (Koenker & Machado, 1999; Koenker, 2005) to consider salary determination for the precise positional data.

Findings

Consistent with the literature, we confirm that outfield players are paid a premium. When players are categorized across the six positional zones, we find no evidence to support an offensive premium or rank order effect. We find a significant effect for the Multi Positional players, indicating a premium is earned for players that can play in more than one pitch zone. Using the micro position data we uncover a salary penalty imposed on certain defenders, but that this is reserved to defensive players who are versatile across the defensive line. No salary penalties are incurred by specialized defenders. In addition to the positional effects, we identify various other significant determinants of player's salary. Expectedly, player ability and experience positively impact salary. Numerous citizenship effects are also present. For the most part, these are robust across both base and G.comp definitions of salary. The results offer partial support to the specialization hypothesis identified in American Football (Simmons & Berri, 2009) and we suggest that the findings bring nuance to the specialism-versatility debate.

Salary and delinquent conduct in the NBA

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Introduction and related literature

In professional sports, athletes typically earn salaries that are at the very top of the income distribution. They are figures of public interest, especially when they misbehave or violate the law. Although the most common types of misconduct are misdemeanors, physical violence and major criminal infringements receive wide media coverage (Raney & Bryant, 2009). Professional sports leagues actively seek to deter misconduct of employed athletes in order to protect the integrity and public perception of their businesses. In the case of off-court misdemeanor or felony cases, additional sanctions by league officials are part of the standard procedure (e.g. the commissioner exempt list in the National Football League (NFL), which suspends players whose legal status is unclear). Consequently, information on misconduct of any kind is made public by the leagues and sanctions (fines or suspensions) are published.

Combined with high transparency on contracts and salaries, professional sports are the ideal environment to study the relationship between income and misdemeanor, while focusing on parts of the income distribution that are typically not well observed. Understanding this particular relationship is of considerable importance for management (in professional sports), but also criminology.

We analyze the effect of salaries on the likelihood to observe misdemeanors, using detailed data on misbehavior of NBA players. We link these data to salary records and performance statistics. We focus on the relative costs of crimes from two perspectives: the salary level, and the severity of fines. Our analysis is extended to exploring the role of heterogeneity among players, e.g., their past performance or career characteristics.

Based on Becker's model of crime (Becker, 1968). Ehrlich (1973) predicts that delinquent behavior can be deterred by three main factors: the probability of apprehension, the severity of punishment, and increased opportunity costs. (See also Chalfin & McCrary (2017).) Committing a crime has potential costs and benefits. An increase of the expected costs above the expected benefits should deter crime. A reduction in wages typically increases criminal conduct (Gould et al., 2002; Machin & Meghir, 2004), while higher minimum wages may reduce it (Corman & Mocan, 2005). However, these findings are restricted to the lower end of

the wage distribution. In the special case of professional athletes with salaries of up to several million dollars, the effect on misconduct is not clear a priori. Delinquent behavior has opportunity costs, e.g., in foregone salary, but if fines are not related to income levels, the deterrence could decrease as incomes increase.

The empirical literature typically focuses on average income earners or low-income earners. In contrast, we focus on wealthy professional athletes. In the context of professional sports, Heckelman & Yates (2003) find that an increase of the probability of apprehension, a doubling of referees, does not deter NHL players from infringements. The degree to which more severe sanctions deter criminal behavior is generally found to be weak since potential offenders strongly discount future sanctions (Lee & McCrary, 2005). Even in professional sports, where sanctions are clearly defined, deterrence is limited. Cullen et al. (2012) find no evidence that the severity of sanctions deters NCAA players from committing out-of-the-game crimes.

Data and empirical strategy

Our data resemble a panel covering 2,060 unique players. This panel consists of 10,412 player×team×season observations from the NBA seasons 1995/96 to 2018/19. Data were collected from basketball-reference.com, hoopshype.com, espn.com, and prosportstransactions.com. The data provide detailed information on the players' salaries, fines, suspended games, personal characteristics, and performance. In total, 1,182 player×team×seasons are reporting at least one penalty that was recorded on or off the court. These range from minor misdemeanor on the court (e.g. overly hard fouls, verbal abuse) to (major) criminal acts off the court (e.g. DUIs, shooting incidents). We employ a series of different fixed effects models with varying sets of controls. We estimate models of the following form,

$$Fine_{i,t} = \alpha + \beta X'_{i,t} + \gamma \log(Salary)_{i,t} + \zeta_{FE} + \epsilon_{i,t},$$

where $Fine_{i,t}$ is a measure of player i 's fine in season t . We analyze both the probability of receiving a fine and whether or not the amount of the fine is associated with the explanatory variables. $\log(Salary)_{i,t}$ is the log-transformed salary, $X'_{i,t}$ is a vector of control variables (e.g. detailed measures of past performance). ζ_{FE} are either player×team×seasons fixed-effects, or a combination of player fixed-effects and a time trend.

In an additional step, we investigate the effect of an exogenous increase in salary on the probability of misconduct. To establish a causal link between salaries and misdemeanor, we use an instrumental variable approach for a subgroup of NBA players close to their first year in the league. The draft status of a player provides exogenous variation for the salary of rookies.

Results

In contrast to previous empirical findings, our preliminary results suggest a positive relationship between salary and the probability to observe misdemeanor. Depending on the empirical specification, a 10% increase in salary increases the amount of fines issued by approximately 1%, relative to the sample mean. Additional results that are based on players in their first five years in the league confirm these results. An instrumental variable approach serves to establish a causal link between salaries and the delinquent behavior for this sample of relatively young players. These causal estimates confirm the positive effect of an increase in salaries on the prevalence of misdemeanor by players.

Our results obviously have implications on professional sports, as they might help in deterring delinquent behavior on and off court. In addition, we shed light on the potentially non-linear relationship between income and criminal behavior. Our results indicate that an increase in income – in the upper part of the income distribution – has a positive effect on the likelihood of misconduct.

Session X: Managers & Coaches

Thursday, 26 August, 19:00 CEST

To go or having to go: Effects of voluntary vs. involuntary job changes on subsequent performance

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Introduction

In 2019, Alec Burks was traded to the Sacramento Kings in exchange for Iman Shumpert from the Cleveland Cavaliers. However, up to this point Mr. Shumpert had not played a single game for the Cavaliers. Hence, to facilitate this trade multiple other trades between a total of three teams took place simultaneously. The Cavaliers acquired Marquese Chriss and Brandon Knight from the Houston Rockets in exchange for Wade Baldwin IV, Alec Burks, and Nik Stauskas. Wade Baldwin IV, Iman Shumpert, and Nik Stauskas, on the other hand, were acquired by the Houston Rockets in exchange for Marquese Chriss and Brandon Knight. In addition to the players, multiple draft picks and traded player exceptions were traded between the teams. This short, rather mind-boggling example, is no exception of trade negotiations in the National Basketball Association (NBA). Multi-team trade deals take place regularly. Due to their complexity, it appears rather unlikely that all involved parties' preferences were addresses equally. Hence, we formulate the hypothesis that not all players are traded on their own terms, i.e., at free will. Simultaneously, the league has seen multiple players declare their desire to change teams by putting their employer on notice that they would like or intend to go play somewhere else as soon as possible, i.e., after becoming free-agents. Put differently, while some players seem to change their teams voluntarily others supposedly have to change their employer involuntarily. This raises the question whether the circumstances of the trades have implications on players performance.

The introduction of free agency in 1988 changed the landscape of player mobility in the NBA (Lin & Chang, 2011). As a result, players became free to choose who they sign with after the fourth year of their career. Deutscher (2011) previously exploited this by comparing the performance of players traded between seasons (free agents and non-free agents) under particular circumstances. Namely, during high pressure situations and in front of different spectator crowds. Deutscher determined that players who had the ability to choose their team freely performed worse due to the increased pressure to perform well. Further, Simmons and Berri (2009) addressed effects of free agency in the National Football league. Focusing on

player salaries rather than performance, they stated that players changing teams after free agency, on average, experience a salary reduction. To our knowledge, there is, however, no research investigating the immediate effects of voluntary vs. involuntary trades on players overall individual performance. There are, however, numerous theoretical reasons to believe that players performance might differ depending on the circumstances of the trade conditions. Apart, from the home crowd effects discussed by Deutscher (2011), there appears to be a matching problem at hand (Jovanovic, 1979). Teams have an incentive to hire the best matching player for their existing team. Also, a player might have various sports (e.g., team fit, winning prospects) and non-sports related reasons (e.g., local income tax differences, family) to be willing or unwilling to play for a particular team. A mismatch of team and player due to a forced trade in light of a trade package might, therefore, lead to an employer/employee mismatch and consequently non-optimal performance (Glenn et al., 2007).

Methodology

To test the main hypothesis, we analyze player-game data across $n = 15,707$ NBA games, spanning 13 regular seasons from 2004/05 to 2016/17, from ESPN, the major US based sports television channel. Data include a complete record of player actions (e.g., free throws, rebounds, turnovers, fouls) and outcome-relevant game situations (e.g., ejections, substitutions, team composition and timeouts). We complement data with important player characteristics (e.g., past performance, playing position) and team characteristics (e.g., past team performance) from <https://www.prosportstransactions.com>, <http://insider.espn.com/nba:hollinger/statistics> (player statistics), <http://stats.nba.com> (player and team statistics). The present data allows to estimate a player's individual contribution to team success, i.e., his individual performance on a game basis.

More precisely, to measure players individual performance on a game basis we follow Berri (2008) and Berri and Schmidt (2010) employing Wins Produced as a measure. Utilizing a more universal measure of player performance, we elaborate on the findings by Deutscher (2011) who focused solely on free-throw attempts and expand previous findings from a rather particular situation to general in-game performance. Wins Produced explains over 90% of the variation in team wins and is relatively stable from season to season (Berri et al., 2010). Specifically, we will consider how each player's Wins Produced per 48 min is related to the factors concerning the circumstances of his trade with respect to his ability to make a free decision, i.e., unrestricted free agents vs. traded players.

Therefore, we append detailed data on contract changes and player transfers to the performance data. Information on players' contract situations is readily available via

<https://www.spotrac.com/nba/free-agents/ufa/>, which is based on official NBA data sources. Detailed contract information contains more than 20 distinct contractual circumstances for players. This allows for categorizing each contractual change and the associated players into a contract specific category, e.g., draft selections, waiver claim acquisitions, restricted free agents, and unrestricted free agents. The present study lays its focus on unrestricted free agents. We hypothesize, that unrestricted free agents are, as the name suggests, free in choosing their future employer/team. Provided that the future team is willing to acquire the player.

Next, we observe all free agents of a particular season which results on average in approximately 200 free agents per season. Most trades appear between seasons, however, they can also appear during the entire course of the regular season up until the trade deadline, which is currently set at Thursday, 10 days before the All-Star Game. This deadline slightly varies across the years in our sample, however, it always took place around the All-Star Game in February/March. Therefore, it is possible to observe performance changes of free agents and non-free agents within a season across different teams.

Exploiting the underlying panel data we estimate a fixed effects regression model with Wins Produced as the dependent variable capturing performance. Independent variables include the contractual situation of the player before the trade (unrestricted free agent vs. non-free agent), previous player and team performances as well as a list of other control variables related to team, opponent, and game characteristics.

Initial results reveal significant differences in players performance with regard to their pre-trade contract situation, i.e., unrestricted free agents vs. non-free agents. Following up to the conference we intend to further expand data with the four most recent seasons, i.e., 17/18 – 20/21, providing more player-game observations, as well, as player trades. Further, we will deepen the analysis by distinguishing between in-season and between season trades.

Manager's Contribution to Team's Performance: The Egyptian Premier Football League

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Theoretical Foundation and Related Literature

Football is by far the most popular sport in Egypt, and the Egyptian Premier Football League is the most-watched league in the country. Hence, it comes with no surprise that it comprises the highest burden of any Egyptian sports club's budget compared to any other sport. This sport's significance extends outside the Egyptian border; the Egyptian national team has the highest record in Africa with seven gold medals in the African Cup of Nations (Egyptian Football Association). Over the media, it has been shown that the Egyptian football team suffers from managerial inadequacies. Instances of conflicts between players and team managers are widely reported from anecdotal evidence (The Guardian, 2018). However, it has not been empirically tested neither in Egypt nor in Africa.

In our research paper, we aim to measure if managers have an impact on the success of their teams in the Egyptian football league. The importance of the contribution of managers originates from corporate behavior theory. Bertrand and Schoar (2003) and Graham et al. (2012) measured managers' impact on their organizations' performance. They proved that managers' influences are heterogeneous, and hence managers' decisions will differ and have different effects on their organizations' performance.

Within professional sports, a lot of studies used different methodologies to measure the impact of managers' quality on the success of their teams. Besters et al. (2016) were able to analyze the managers' influence on the performance of their teams within the English premier football league due to the high turnover rate in-season in the English Premier League of football. They found productive and counterproductive results on the teams from the managers' replacements within the football season. Fizel and D'Itry (1997) found that coaches' turnover rates in-season negatively impact the performance of basketball teams even if the new coaches were more efficient due to the disruption. Muehlheusser et al. (2018) analyze the managers' contribution to their teams' success in the German Bundesliga using the rate of managers' turnover and found that they have an impact on teams' performance. Further literature showed that higher salaries for coaches significantly impact team performance (Colbert and Eckard, 2015; Frick and Simmons, 2008). To the extent of our knowledge, this is the first study to

analyze the managers' effect on their teams' performance in a developing African country, namely Egypt.

Data and Methodology

Our dataset covers 24 seasons from 1996/1997 till 2019/2020. Each team plays twice against each other, one home match and one away match for each team. The winner of each match takes three points. In the cases of a draw, each team will take one point. By the end of the season, all the rankings are based on each team's accumulated points. Prior to 2015/2016, the number of teams varies from 14 to 20 over the seasons. However, the number of teams stabilized at 18 teams per season starting 2015/2016 onwards. Each year three teams are promoted from the second division, and three teams are relegated. We have 50 teams who assigned a total number of 211 managers from 30 different countries. Approximate 38% of these managers are from non-Egyptian countries who coached a total of 14 other teams.

We run an OLS regression for managers and teams fixed effect. To measure managers' contribution, we should have high turnover rates of managers. Thus, the same manager hired for more than a team and different teams hiring the same managers. The Egyptian Premier League has high turnover rates of managers (between seasons and also in-seasons). Therefore, we will follow the methodological approach used in Muehlheusser et al. (2018). The high turnover rate in the data and the managers' fixed effect will enable us to measure the manager's contribution separately from other impacts.

The dependent variable is the average number of points per manager per team per half-season. The relation between the manager and the team is defined through the term "Spell". A spell is the total number of matches of a team with the same manager without interruption (Muehlheusser et al., 2018). Several conditions have to be applied before computing the model. First, the footprint condition requires each spell to last for at least half-season matches consecutively. Since the league was changeable during the years, the footprint condition will also differ from one year to another based on the total number of matches in each year's half-season. For instance, if the season includes 14 teams, then the minimum number of spells this year will be 13 matches, while if it consists of 18 teams, then the spell has to last for 17 matches.

The average spell of a manager is around 18.85 matches. However, the range is quite broad; there is a manager who lasts for up to 242 matches (total of 9 seasons), and there are 35 managers who stayed only for one match. These managers were usually coach assistants, where they coached during the dismissals within the season until the new manager arrived. Therefore, these coaches who were discharged in the short term and didn't have an impact on the team will be removed from the data on applying the footprint (F)condition. Four teams are also dismissed

after applying this condition. These teams appeared in the league only once or twice and were relegated after that. The second condition that has to be applied is the Mover- Team (MT) condition. Each team has to be with at least one mover manager. So managers are considered as mover when they are observed with more than a team. We have teams that were managed with 15 different managers and managers that were coaching 7 other teams.

The final dataset after applying both conditions consists of 40 teams, 107 managers (43 movers and 64 non-movers), 628 observations and 243 spells. To assure the high turnover rate in our data, 46% of the mover managers coach more than 2 teams, and 42% of the teams have more than 5 managers.

Major Findings

In line with the literature, we check the individual manager fixed effect in more details. First, we ranked the managers based on their coefficients and put the median manager as the reference category on our model. We found that the top 3 ranked managers are highly significant. This means that if the team hired the highest-ranked manager (Patrice Carteron) *ceteris paribus*, they won on average 0.76 more points than other teams hiring managers with median capability. Thus, this means that this manager would, on average, makes the team have 12.9 extra points per half-season. This additional point could help a team ranked 8th in the 2018/2019 season to finish the season in 2nd place and be qualified for the CAF Champions League (Confederation of African Football). We can conclude that managers have an impact on their team performance and that their contribution is heterogeneous.

The ultimate scapegoat: COVID-19 and managerial turnover

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Introduction

Since the outbreak of COVID-19, many countries have put various measures in place to contain the spread of the virus. Worldwide, those measures have caused severe economic consequences and have significantly affected firms' performance across industries (Shen et al. 2020). The pandemic also had a considerable impact on professional sports. In European football, in most countries, the 2019/2020 season was suspended and resumed after a couple of months without spectators. This did not change for the season 2020/21, where, at the moment, in almost all countries around 75% of the current season has been played without fans. Accordingly, this has resulted in the European top leagues recording significant financial losses of around 4.5 billion pounds in operating revenues through 2020 (KPMG, 2021).

In addition to the absence of spectators, the teams and players had to deal with other measures put in place by governments to contain COVID-19 such as social distancing, regular COVID-testing, and other specific health and hygiene precautions. Research has already demonstrated that these circumstances affected the performance of teams including a reduced home-court advantage, a vanished referee bias, and a lower running performance (Bryson et al. 2021a; de Souza et al. 2021). Naturally, the question emerges if teams are taking these external effects into account when evaluating their performance. This is, in particular relevant, in the context of the teams' decision to dismiss their manager if the team performs below expectations.

Previous research has shown that poor performance (Bryson et al., 2021b) and in particular deviations from the performance expectations (Pieper et al., 2014) are significant predictors of the likelihood that a manager is dismissed. Hence, this study investigates if the teams' decision to dismiss their manager during the COVID-19 pandemic differs in comparison to previous seasons. Therefore, data from the Top-5 leagues in Europe is utilized and based on the existing literature an empirical model estimating the probability of a manager getting replaced is applied.

Conceptual framework and literature review

Existing literature has compared the dismissal of a manager to the replacement of top managers outside sports and has connected the literature to the research strand of CEO succession literature. Consequently, many existing studies build on a model from Fredrickson

et al. (2006) describing the factors influencing the likelihood of a CEO's dismissal. The authors argue that an organization's performance affects the dismissal decision but other factors moderating this relationship have to be taken into account as well. As noted, research related to manager replacement in professional sports found that various indicators of sporting success and expectations to the team have a significant impact on the probability of a manager getting dismissed (e.g. Bryson et al. 2021; Flores et al., 2012; Humphreys et al. 2016). However, manager characteristics such as salary (Barros et al., 2009), experience (Frick et al., 2010), tenure with the team (Allen & Chadwick, 2012), or being an ex-player (Bryson et al., 2021) do have significant influence as well.

A public health crisis such as the COVID-19 pandemic including all its consequences could potentially change the determinants of a manager dismissal. Based on the existing literature regarding crisis management, COVID-19 would classify as a crisis of an event that can be defined as a “low probability, high impact situation that is perceived by critical stakeholders to threaten the viability of the organization” (Williams et al. 2017; p. 735).

The literature on manager dismissal during a crisis is limited. Beneish et al. (2017) showed that in the context of misreporting, firms are more likely to replace the CEO if retention costs are high in comparison to replacement costs and Kulich et al. (2015) demonstrated that during a crisis women are more likely to get appointed as a signal of change to stakeholders. In professional sports, the succession literature on manager dismissals has found evidence for the scapegoat hypothesis which describes a teams' decision to fire a manager mainly because stakeholders have to be conciliated by giving them a “scapegoat”. This rather irrational decision would not improve the performance of the team after the replacement. In a similar vein, Flepp and Franck (2021) investigated the performance effect of wise and unwise managerial dismissals by differentiating between actual poor performance and poor performance due to bad luck. The authors found that a performance improvement can only be expected succeeding wise manager dismissals.

With the economic burden and the unusual circumstance of COVID-19 in mind, it is hypothesized that teams are less likely to dismiss a manager only to provide a scapegoat for poor performance.

Methods and preliminary findings

The data stem from the highest divisions in the Top-5 European football leagues in England, France, Germany, Italy, and Spain. Overall, the data covers a period from 2000-2021 including $n=207$ teams. In total, the sample includes $n=74,133$ team-match observations. For each observation, details about the match such as the result, gameday, season, and crowd size

are available. In addition, information about the manager including his tenure and personal characteristics and team-specifics such as the points in the league and the current rank in the table are included.

The descriptive results indicate a significantly lower number of manager dismissals during the 2020/21 season compared to the average season dismissals. In the period before the 2020/21 season, on average 71.35 manager firing occurred, in total, in the top-5. During the current season, the number has dropped to 34 manager dismissals. However, it has to be considered that in all five leagues the seasons are still going on but even when accounting for games played, a significant reduction in the current season can be observed.

Preliminary results from a logit regression model which determines the probability of a manager getting dismissed indicate that the effect remains significant even when controlling for team-specific characteristics and season characteristics similar to previous research of, for example, Bryson et al. (2021), Frick et al. (2010) or de Dios Tena and Forrest (2007).

As a next step, data from other European football leagues will be added to the existing dataset. Moreover, additional control variables will be used in the empirical model including variables indicating the severity of the financial consequences of the COVID-19 pandemic for the respective teams. Also, the analysis has to be expanded by differentiating between a “scapegoat-dismissal” and a “non-scapegoat-dismissal. Therefore, further analysis will focus on the consequences of the manager dismissal and how the teams performed after the managerial change. Hopefully, this will shed further light on mechanisms responsible for this significant decline in managerial turnover during an external crisis such as the COVID-19 pandemic.

Session XI: Competition

Friday, 27 August, 17:00 CEST

Survival of the fittest: Experience quality, market demographics, and competition

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Introduction

Fitness center and gyms is an important supporting subsector of sport industry (Eschenfelder & Li, 2007). Coded as 713940 under the North American Industry Classification System, the industry comprises business establishments primarily operate fitness and recreational sports facilities that feature exercise and other active physical fitness conditioning activities. In the United States, there were 108,194 business establishments in this industry employing 843,461 people with a total revenue of 37.9 billion in 2019 (Le, 2019). The U.S. health club membership reached 71.5 million consumers in 2019, and about 1 in 5 Americans belong to at least one U.S. health club or studio. However, the health-fitness industry is very competitive, and the market is highly segmented: the top four leading players only accounted for about 20% of total market share with over 111,977 locations competing in this market in 2020 (Le, 2019). Due to the impact of COVID-19 and technological advancements, there has been an increasing presence of at-home fitness services (Kennedy, 2020). The resulting deflection rate in this industry is very high. It is reported that **53.5% of all new members would terminate their membership within 12 months** (MobileFit, 2017). According to this research, about 20% of the gyms and fitness centers might have closed over the past a few years.

Much work on the survival of firms has been carried out by industrial organization and marketing researchers (Manjón-Antolín & Arauzo-Carod, 2008; Shugan & Mitra, 2014). Many factors are found to be relevant to business survival. Conceptually, they can be categorized as internal/firm-specific and external/environmental variables. Internal variables include such variables as innovation, human capital, cooperation partners, financial resources, firm size, firm age, business operations. The external factors can be further divided into industry, business-cycle, geospatial socioeconomic factors (Manjón-Antolín & Arauzo-Carod, 2008). The purpose of this study is to examine the survival of fitness centers and gyms and explore how experience quality and market environment impact a business's survival.

Hypotheses Development

Gyms and fitness centers rely heavily on membership fees, which represent approximately 2/3 of the total revenues. The other secondary revenue sources also rely on the patronage of the club members (Le, 2020). Businesses have increasingly relied on providing high-quality customer experiences in effort to recruit and retain members. Customer experience is a holistic experience arising from direct and indirect interactions between the customer and other actors across all channels throughout the three stages of the entire customer journey: pre, during, and after the service usage (Kuppelwieser & Klaus, 2020). It was found to have a strong direct influence on satisfaction and perceived value, and a strong indirect effect on loyalty and word of mouth (Roy et al., 2019). In the marketing literature, there had been mixed findings regarding the relationship between quality investment and business performance. For example, in the context of sport retailing, Mao (2020) found that the impact of retail quality on survival is nonlinear. However, fitness industry differs from sport retailing in that the former has higher customer contact. This stream of literature leads to the following two hypotheses:

H₁: Store rating, as a proxy of experience quality, will have a positive impact on the survival of sporting goods stores.

H₂: Store rating, as a proxy of retail quality, will have a linear impact on the survival of sporting goods stores.

Geospatial socioeconomic (e.g., income, household size, property ownership) and sociodemographic (e.g., age, gender, ethnicity) variables play significant roles in market selection and formulation of marketing strategy. These geospatial variables are important aspects of market environment for two main reasons. First, geospatial factors are indicators of the size of a target market and buying power of a market, which are important criteria for market selection (Shugan, 2011). Second, geospatial factors are often correlated with those unobservable variables, such as preference and taste, which is the theoretical foundation of commonly practiced market segmentation methods (Wedel & Kamakura, 2000). The literature on market selection and competition leads to the following two hypotheses:

H₃: Market competition has a negative impact on the survival of gyms and fitness centers.

H₄: Market characteristics are related to the survival of gyms and fitness centers.

Methods

Data relating to fitness centers and gyms are extracted from two Yelp datasets released in 2020 and 2021 respectively, which include 3814 businesses operated in 710 Zip Code Tabulation Areas (ZCTA) in the United States. Among the 3814 businesses, 788 had closed.

The main variable to test H1 and H2 is store rating (StRat) and its polynomial terms (StRat2 and StRat3). The main variable to test H3 is competition intensity (BizDens1M), which is used to capture market competition within a geographic location. The market characteristics are captured by density of the local population (PopDens), size of the target market (POP), buying power of the target market (MHI) and cost of rental (MMGR), which in turn are approximated by using data from 2013-2017 American Community Survey. Review variation (RvwVar), review volume (RvwVol) and whether a store is a chain (IsChain) are included as covariates. Given the hierarchical nature of the data, we use mixed effects logistic modeling with both level-1 (POP, MHI, PopDens, and MMGR) and level-2 (StrRat, StrRat2, StrRat3, BizDens1M, RvwVar, RvwVol, IsChain) explanatory variables.

Results and Discussion

H₁, H₂ and H₃ received full support and H₄ received partial support. Our major findings are: (a) retail quality has a positive impact on survival ($B = 0.58$, $p < .001$) and the effect is linear (polynomial terms were not statistically significant); (b) market competition has a negative impact on survival ($B = -0.03$, $p < .001$); (c) 8% of the individual variation in survival is due to systematic differences between ZCTA; (d) only population was negatively related to survival ($B = -0.14$, $p = .002$) and all other ZCTA-level variables were not statistically significant. In comparison with the results from other industries, this study provides empirical evidence that industry category is a moderator in the relationship between quality investment and business survival. The impact of quality on high customer contact industries is larger in comparison with low customer contact industries. The relationship is linear instead of nonlinear. Market environment played a less important role in the current context. The findings have also practical implications for site selection and designing a quality improvement program.

Subsidy competition in professional football in Europe: a case of a CEE country

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Introduction

International economics research on subsidy competition has argued (e.g., Kondo, 2013) that a rivalry between regions or countries in attempts to entice companies or external investment that could induce agglomeration effects, often leads to inefficiently low net taxation levels – or too high subsidies. Not dissimilarly, as summarized by Coates (2019) sport economics literature has examined the costs and benefits of subsidies aimed at enticing Northern American teams from major leagues to stay in or to reallocate to a given city.

Ross and Szymanski (2002) argued that under the open league systems the possibilities for clubs to extract subsidies from local governments would be lower than closed league systems. Nevertheless, in Europe, where the former framework has been the dominating one, the involvement of central and local governments had been relevant as well, even if in the top leagues the financing model has shifted towards a more market-based one (Andreoff, Staudohar, 2000).

Furthermore, due to traditional social role of spectator sports – facilitating integration of local communities - and persistent relevancy of the local markets for the revenue generating potential, the development of professional sport clubs is supposed to be strongly related to their location. Using spatial econometric modelling techniques, Doran and Jordan (2017) argued that agglomeration effects - spatial positive spillovers of on-field success could be found for English football clubs, which might be interpreted as a motivating influence within local rivalries. This analysis has shown that spatial correlation does occur and should be considered within analysis of determinants of football clubs' location. One should note, however that at the top tiers of European football, especially in England (as indicated, e.g., by the UEFA Club Licensing Benchmarking Report, 2020), the direct role of public funds has been limited. Hence, to assess the subsidy competition, one should consider less commercially developed leagues.

Therefore, the aim of the analysis was to assess the significance of local governments' funding for the level of development of men's football in a league system outside the top European ones, while taking into account spatial effects.

Data and methods

To achieve the aim, a dataset based on outcomes in all (four) professional tiers of a league system in a CEE country was constructed. This allowed for inclusion of numerous clubs in case of which financial involvement of local governments was substantial. The analysis was based on cross-sectional spatial econometric models. As the dependent variable, number of clubs located in a given regional unit, weighted by the tier at which these clubs competed and their win ratios and averaged over three seasons, was used.

Historical expenditure of local governments measured by types of expenditure (current and capital) and objectives (e.g., sports). As control variables, a set of measures of demographic, economic and social development at the local level has been utilized.

Selection of models was based on Moran and LM tests and methodological considerations. Inverse distance matrix was used. As the preferred one, spatial Durbin error model (SDEM) was chosen.

Results

The preliminary results show that spatial negative correlation of men's football clubs development level is evident and robust to specifications. Furthermore, the analysis of the SLX and SDEM models suggests that subsidies on the local government level are partially responsible for the observed effect. In particular, the driving factor seems to be spatially and time-lagged expenditure on market services, including promotional purposes, but not public investment (which would include spending on sports infrastructure and direct ownership or co-ownership of clubs), direct subsidies to clubs (which would include financing of youth sports) nor current expenditures on sports (which would include expenditure on administration of sports policy).

On the other hand, the development of clubs is positively influenced by both the propensity of 'their' local governments to spend funds on promotion and past investment expenditures on sports, showing the sustained importance of public financing. Conversely, direct subsidies to clubs (which include funding of youth football) did not have a significant impact.

Discussion and implications

The result is consistent with anecdotal observations on the structure of public funds aimed at financing clubs in the subject country. Namely, professional clubs are effectively subsidized under the guise of being marketing vehicles. Furthermore, the results hint that effectively creates a negative externality on surrounding areas in terms of football development. On the lower-tier level, competition is regionalized and, in the long run, subsidies hinder

possibilities of other clubs being promoted to a higher league which would result in access to new sources of revenues, including sales of TV rights. Secondly, within lower leagues and limited mobility of players this effect can be strengthened through scarcity of talent pool that can be exhausted by subsidized clubs. This process can be related to the observation of Kuper and Szymanski (2009) about democratic capital cities and their relative underperformance in terms of football clubs' long-term success. Our results suggest that proximity of relatively affluent suburban municipalities capable of subsidizing clubs might contribute to it.

When colleagues come to see each other as rivals: Does internal competition affect workplace performance? Evidence from European soccer

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Introduction

The phenomenon of social pressure – or commonly referred to as peer pressure – has long been studied by researchers in different disciplines. In the labor market, understanding the impact of social considerations on an individual's performance, productivity and behavior offers huge beneficial potential for managerial decisions. Whereas the theoretical concept of peer effects in the labor market has been thoroughly addressed by many scholars up to date, empirical evidence supporting their actual existence is rare. Mas & Moretti (2009), Bandiera et al. (2010) and Falk & Ichino (2006) belong to the most prominent scholars providing evidence for peer effects in workplace settings.

Placing focus on professional sports, Gould and Winter (2009) show that co-worker output can positively impact an individual's performance. Doing so, they control for team-internal rivalry to rule out that the effects found are a result of players competing for playing time instead of productivity spillovers. It is at exactly this point our study comes into action: We assume that rivalry could be a major trigger for peer effects at work and thus have a significant impact on an individual's workplace performance. There are many reasons why employees might experience workplace competition with their colleagues or come to see each other as rivals - such as in the event of potential promotions or in terms of internal standing and prestige. To test for our assumption – that having a rival in line of sight doing his best to get that place in the spot impacts an individual's workplace performance – we focus on an in-team peer setting that is highly competitive in nature: Duos of goalkeepers in professional soccer. Whereas each team has at least two goalkeepers in their squad, there is only room for one keeper playing at a time with the other(s) consigned to the bench. Given the assumption that professional athletes are driven and strive to maximize playing time, the soccer goalkeeper finds himself under enormous pressure: Either one is given the goal to or one is left as the number two player, desperately waiting for one's time to come. In general, we consider three different performance outcomes to be possible: Internal competition on the goalkeeper position could promote motivation, leading players to increase their effort and thus improve their performance to outperform teammates. However, internal competition could as well turn out to have an

inhibiting effect on individual motivation and productivity and thus prevent goalkeepers from recalling their maximum performance. Finally, in line with Guryan et al. (2009), we cannot rule out that “successful, skilled workers may have chosen over the course of their life to invest in human capital whose productivity is not dependent on social spillovers, whether positive or negative, in order to avoid risks out of their control” (p. 63).

Empirical Analysis

The data set

Our data is based on 1.279 individual performance observations for goalkeepers in professional soccer from season 2014/15 to season 2018/2019. In line with previous studies, we focus on the five leading European leagues in England, France, Germany, Italy and Spain. Peers are attributed in consideration of playing time and / or line-up success in the given period.

The model

We start by specifying a model describing performance determinants for goalkeepers in professional soccer accounting for internal rivalry. We assume that the goalkeeping performance⁵ of player i , active in team j in period k ⁶ is given by:

$$performance_{i,j,k} = \beta_0 + \beta_1 PA_k + \beta_2 AD_k + \beta_3 NOI_{ijk} + Fixed_{j,k} + \varepsilon_{i,j,k} \quad (1)$$

PA_k denotes the peer's ability⁷ at the beginning of an individual observation period, AD_k is an indicator for the absolute value of age difference between focused player and peer (measured in years) and NOI_{ijk} is a dummy indicating whether player i can be considered team's number one goalkeeper at the beginning of k . Finally, we use multi-level fixed effects for country, team and season represented by $Fixed_{j,k}$. In our model, we do not only assume PA_k to measure the peer's isolated performance ability at the beginning of an individual period but expect it to reflect the peer's perceived level of implicit threat from the focused player's perspective. In a next step, we expand the model to account for the explicit threat of the peer by including their actual performance showed in the observation period:

$$performance_{i,j,k} = \beta_0 + \beta_1 PA_k + \beta_2 AD_k + \beta_3 NOI_{jk} + \beta_4 Y_k + \beta_5 Y_k \times NOI_{ijk} + Fixed_{j,k} + \varepsilon_{i,j,k} \quad (2)$$

Y_k describes the peer's performance in k based on the individual number of games played. $Y_k \times NOI_{ijk}$ is included to account for the fact that peer performance might affect first-choice keepers and their rivals differently. We use OLS to estimate our coefficients.

⁵ Goalkeeping performance is assessed using player ratings from the soccer statistics platform Whoscored.com as well as the goals prevented metric developed by statistics provider Opta

⁶ An individual observation period reflects a half-series of each season

⁷ Peer ability is measured using adjusted Transfermarkt market values. Scholars have yet identified a player's age and participation in the national team as most important drivers for market values next to the player's pure ability or talent (e.g. Serna Rodriguez et al. (2019) or Franck & Nuesch (2012)). To get a more accurate and isolated assessment of a player's ability using market values, we proxy a player's pure ability by the residuals of regressing transfermarkt market values on player's age and active national team status.

First Findings

We find that a peer's implicit threat measured using adjusted market values for ability does not have a significant impact on goalkeeper performance. Instead, we find significant and negative performance effects for an explicit peer threat. Our results suggest that, once the peer gets the chance to prove his skills, competing against a stronger opponent causes deterioration in a goalkeeper's performance. However, these findings do not relate to goalkeepers considered a team's number one in the given season. For number one players, internal rivalry appears to work exactly the other way round as we find significant and positive results. We do not find our results affected by the age difference within a duo of players. Altogether, our findings suggest that internal rivalry motivates a team's number one but demotivates the number two and thus prevents the "underdog" from performing at their best. Our results are robust to the indicator used to measure goalkeeper performance as well as once rotations on the goalkeeper position are caused by injuries or dismissals only.

Ultimately, our study provides evidence that internal rivalry is a driver for performance related peer effects at work and thus bears potential for improved managerial decisions on team / worker composition to maximize group output.

Session XII: Performance II

Thursday, 26 August, 19:00 CEST

Adapt or Die? Integration and Team Performance in the NBA

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Introduction and Literature Review

It is a truism in Economics that competitive markets place discriminatory employers at a disadvantage. Access to a cheaper, more talented pool of labor enables non-discriminatory employers to outperform employers who refuse to employ members of an unfavored group. If there are enough unprejudiced (potential) employers, prejudiced employers will soon be faced with a simple decision: adapt to the new reality or be driven out of the market.

The sports world is full of anecdotes about teams whose success stems from their willingness to integrate and whose failure stems from their failure to adjust to the new reality. Willingness to employ black players has been tied to the rise of numerous dynasties in professional such as the Brooklyn Dodgers baseball team of the 1950s, while an unwillingness to integrate has been cited as a major reason for the decline of the Boston Red Sox over the same period.

Scholarly research has reinforced the popular impression that integration leads to better performance, most notably in studies by Hanssen (1998) of Major League Baseball and Szymanski (2000) of the English Football League. Both found a clear association between integration and performance. More recently, Goff et al. (2002) claimed that successful teams are more likely to integrate because they seek out competitive advantages, while Hanssen and Meehan (2009) find evidence that weaker teams are more driven to integrate because of their failure using traditional methods. Ironically, despite the fact that the Boston Celtics' dominated the National Basketball Association (NBA) in the late 1950s and 1960s (from 1957 through 1969, the Celtics won 11 NBA championships) by being at the forefront of integration in the NBA, there has been no systematic study of how integration affected team performance in the NBA.⁸

This paper fills a hole in the literature by systematically analyzing the impact of integrated rosters on performance in the NBA. Surprisingly, we find that, at least at first, employing a black player, using a black player in a starting role, and giving more playing time to black players had no impact on team success. For the first five years of an integrated league,

⁸ The Celtics were the first NBA team to have a starting team consisting entirely of black players and were the first team to employ a black head coach. It is possible that the Celtics' success made the impact of integration seem so self-evident that no one felt it was worth further study.

no measure of employing black players that we used had a statistically significant impact on team performance. In the latter half of the 1950s, however, the relationship between utilization and performance became pronounced. Not surprisingly, the representation of black players in the NBA began to rise as well.

Methodology, Data, and Results

We begin by attempting to find a causal relationship between integration and team success in the NBA. We do so by applying a standard differences-in-differences model to the teams in the NBA. We estimate the equation

$$WIN_{it} = \beta_0 + \alpha_i + \tau_t + \beta_1 POP_{it} + \beta_2 INC_{it} + \beta_3 BPOP_{it} + \beta_4 TEAMINT_{it} + \varepsilon_{it} \quad (1)$$

Where WIN_{it} is the winning percentage of team i in year t , POP_{it} is the population of team i 's home state in year t , INC_{it} is per capita income in team i 's home state in year t , $BPOP_{it}$ is the percentage of the population of team i 's home state that is black in year t , and $TEAMINT_{it}$ is a dummy variable equal to 1 in the year team i integrated and all subsequent years.⁹ We used several alternative measures of integration, including the year in which a team first employed a black player, the year in which a team employed at least three black players, and the year in which a team first employed a starting player who was black. Our identification strategy uses the fact that teams first integrated over several years in the early to mid-1950s.

Our data set includes all NBA teams that existed in 1950, the first year that black players appeared in NBA games.¹⁰ The data set extends from 1946-47 to 1963-64. Because the NBA formed in 1949 from the merger of the National Basketball League (NBL) and the Basketball Association of America (BAA), we use pre-1949 data from the BAA. All basketball data come from the basketball-reference.com website. Our control variables come from US Census data and are interpolated for the years between the decennial censuses.

As noted above, none of our measures of integration had a statistically significant impact on team performance. A closer look at the data suggested why this might have happened. A scatterplot of the percentage of total minutes played by black players shows a startling pattern. Teams operated within a narrow band between 1950 and 1955, with teams allocating between 0 and 20 percent of total playing time to black players. In the second half of the 1950s, this band becomes upward sloping. Thus, while the range remains about 20 percentage points, the time allocated to black players rises for almost all teams.

Based on this observation, we estimated a different set of regressions

$$WIN_{it} = \beta_0 + \beta_1 POP_{it} + \beta_2 INC_{it} + \beta_3 BPOP_{it} + \beta_4 PTB_{it} + \varepsilon_{it} \quad (2)$$

⁹ We use state-level data because population data were not available for some of the smaller cities.

¹⁰ It is worth noting that the first non-white player in the NBA was Wataru Misaka, a player of Japanese descent, who played for the New York Knicks in the 1947-48 season.

Where all the variables are as in Equation (1), and PTB_{it} is the percentage of total playing time given to black players on team i in year t . Data for PTB_{it} also come from basketball-reference.com. We estimated Equation (2) using team fixed effects and ran two separate regressions. The first was for years prior to 1956, and the second was for 1956 and following years.

The two regressions yielded striking results. Prior to 1956, a small increase in the number of black players had a small, statistically insignificant impact on team performance. In the later time period, the coefficient on PTB_{it} increased by a factor of three (from 0.09 to 0.27) and was statistically significant at the five-percent level.

Conclusions

There are several possible explanations for the change of state that occurred in the mid-1950s. The first has been neatly summarized by George (1992), who interviewed several of the pioneering black players in the NBA. They almost uniformly asserted that teams did not utilize their skills properly, insisting that they fit into systems that stifled their performances.

A related possibility is the lack of information about black players. Unlike baseball, in which the early black players had performed in the parallel Negro Leagues, or football, in which big-time college teams performed at a level that was much closer to the NFL than is the case today, basketball teams in the early 1950s had a less clear window onto potential talent.

Finally, the 1950s were a time of “technological” ferment in basketball. Unlike baseball or football, in which strategies may have changed, but the basic structure remains the same, basketball adopted significant rules changes during this period. To cite two, the foul lane was widened from six-feet to twelve, the 24-second clock was introduced. These changes greatly increased the fluidity of the game and might have enhanced the contributions of black players. The precise reason for this change, however, awaits further research.

International Assortative Matching

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Introduction and literature

A common prediction in economic models of the labor market (e.g., Terviö, 2009) is that relatively more productive firms should employ relatively more able workers, and likewise, that less productive firms end up with less able workers. The intuition for this prediction is straightforward. More productive firms have more to gain from hiring high ability workers and will therefore offer them a higher wage. Low productivity firms are unable to match these wage offers. In the absence of market frictions, which may hamper worker mobility, low productivity firms will therefore fail to retain the high ability workers they may initially employ. This process then leads to “positive assortative matching” between workers and firms in labor market equilibrium.

In this paper we investigate the strength and direction of assortative matching in the European labor market for football managers. In particular, we contrast the degree of assortative matching in a national labor market, i.e. among firms and workers within the same country, with the degree of assortative matching in the international, European labor market. This allows to assess in how far national borders induce labor market frictions, and hence how integrated the EU labor market in this industry has become.

Despite its theoretical and intuitive appeal, it has proved challenging to confirm the presence of assortative matching in empirical research. Initially, researchers estimated worker and firm fixed effects in a wage equation and examined the correlation between both (Abowd et al., 1999). This approach suggested matching was either not assortative, or even negatively assortative (Andrews et al., 2008), meaning that high ability workers appeared to work at firms with low productivity. In an attempt to explain this surprising finding, subsequent research focused on both theoretical (e.g., Eeckhout and Kircher, 2011) and empirical issues (e.g., Andrews et al., 2008; Jochmans and Weidner, 2019) with the use of wage fixed effects. To circumvent these issues, Bartolucci et al. (2018) propose to rank firms using data on profits, while independently ranking workers based on wage information. Alternatively, Mendes et al. (2010) and Filippin and van Ours (2015) use direct information on physical output produced, instead of wages, to estimate the productivity of workers and firms. We propose an extension of the latter approach. Since we directly observe physical output produced (results on the field),

we can derive worker (manager) productivity rankings without relying on wages. We can furthermore link the turnover of each employer (club) to the physical output produced. This in turn allows us to assess the relative productivity of firms. The correlation between both rankings characterizes the degree and direction of assortative matching.

Methods

Since the performance of workers in the labor market can readily be observed through the results of games, we do not rely on wage data to assess a worker's individual output productivity. Instead, we assume that the productivity of a manager consists in his capacity to maximize the performance of the team on the field given the amount of playing talent, which the team employs. As such, the notion of worker productivity in this analysis resembles the idea of the teacher 'value-added' models used in the economics of education literature (e.g., Jackson, 2013). As in Peeters et al. (2021), we model the goal difference (y_{mijt}) at the end of game g between two teams i and j played in season t of league l , as follows:

$$y_{gijt} = \beta_{hl}(h_{gi} - h_{gj}) + \beta_{xl}(X_{it} - X_{jt}) + \gamma_i - \gamma_j + \mu_{gi} - \mu_{gj} + \varepsilon_{gijt}. \quad (1)$$

In equation (1) the dummy variables h_{gi} and h_{gj} take the value 1 when either team i or team j plays game g in its home stadium. The vectors X_{it} and X_{jt} control for the playing talent both teams employ, measured by their annual payroll expenditure. Both the estimated coefficient for home advantage (β_{hl}) and playing talent (β_{xl}) are allowed to vary by the league in which the game takes place. A set of fixed effects for the teams (γ_i and γ_j) and managers (μ_{gi} and μ_{gj}) measure the contribution of the firms and workers to the 'output' production. These worker fixed effects therefore serve as the primary measure of worker productivity in the empirical analysis.

Next, we turn to estimating each firm's individual productivity in generating revenues from output. We define this productivity as the marginal revenue increase of an improvement in on-field performance. We model the revenues R_{lit} of a football club i playing season t in league l using a log-linear specification similar to Peeters and Szymanski (2014):

$$\log(R_{lit}) = \beta_l y_{it} + \beta_x X_{it} + \alpha_i + \tau_t + \lambda_l + \varepsilon_{it}. \quad (2)$$

In equation (2), y_{it} stands for the on-field performance of team i in year t , measured either by the log average number of points per game or the average goal difference per game. The model allows for the revenue effect of on-field performance to vary by league. The control vector X_{it} contains the logarithm of the book value of the club's tangible assets and indicator variables for promoted and relegated clubs. Finally, the model includes three types of fixed effects, α_i , a firm-specific factor, which can be interpreted as the result of the club's history or marketing know-how, λ_l , a league-specific factor, which controls for league-wide revenue shifters such as

the TV contract, and τ_t , a year effect to account for the growth of the football industry over time. Using this estimated model, we then calculate the additional revenue corresponding to an increase in on-field performance (y_{it}) for club i in year t .

In the final step, we rank employees by their estimated ability from model (1). We similarly create rankings of employer productivity using the marginal revenue estimates from model (2) or the club fixed effects from model (1). We repeat this exercise at the start of each season in the dataset such that we obtain a panel of rankings for both employers and employees. We then calculate the rank order correlation between the rank of each employer and its employee at the start of the season. We do this both within each country and in the combined dataset of all countries.

Dataset

We have constructed a dataset containing financial account information (e.g., revenues, wages, assets...) for clubs in Belgium (div. 1), England (div. 1 and 2), France (div. 1 and 2), Germany (div. 1), Italy (div. 1 and 2), Holland (div. 1), Portugal (div.1), Scotland (div. 1) and Spain (div. 1). The data roughly covers the period 2003-2018 but is not equally complete for all countries. We match this to a complete dataset of match results for both national and European competitions. The data specify the manager of each club in each game, as well as a set of manager personal characteristics (e.g., date of birth, playing career and nationality).

Preliminary Results

The data show that worker migration in this labor market is substantial. However, the pattern of migration varies significantly across countries. The Netherlands, for example, sends a significant number of migrants abroad, but Dutch firms themselves employ the smallest share of migrant workers in the sample.

When we look at the correlation between worker ability rank based on model (1) and the firm marginal revenue rank derived from model (2), we find strong evidence of positive assortative matching. Our result hence confirms the standard theoretical prediction. We do not find positive assortative matching when we base both the worker and firm ranking on the fixed effects estimated in equation (1). This finding underscores that methodological issues in previous research, which uses the approach based on fixed effects from wage models, may be responsible for finding non-assortative or negative assortative matching.

The degree of positive assortative matching is at least as large in the international market (across countries) as in each national market (within each country). This suggests that national borders do not prevent assortative matching between workers and firms within the European

labor market for football managers. We interpret this as evidence that the labor market is highly integrated across national borders.

Session XIII: Careers II

Thursday, 26 August, 19:00 CEST

Is the labor market for goalkeepers efficient?

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Our study

Empirical studies of pay in association football have tended to focus on outfield players due to data availability (Carrieri et al., 2018). Goalkeepers have typically been excluded from analysis as their roles and performance metrics are very different to outfield players. This paper fills this gap using a data set of over 200 goalkeepers in the top five European leagues (England, France, Germany, Italy and Spain) covering seven seasons 2013/14 to 2019/20. We aim to assess the efficiency of the labor market for goalkeepers in these leagues.

Method and data

We estimate conventional wage equations where log of basic pay is the dependent variable. Salary information was gleaned by Giambattista Rossi from a survey of player agents and the salary data cover base pay of players in each of the top five European leagues. This is the most comprehensive football salary data set constructed thus far and is clearly preferable to subjective expert assessments such as www.transfermarkt.de. Cross checking the salary data against actual salaries in Italy Serie A obtained from *Gazzetta dello Sport* shows a very close correlation.

Control variables include player age and age squared, career appearances in top five leagues, UEFA competitions, other leagues, national team and national team under 20 and under 23 and minutes played in the previous season. We include points per game and log attendance as team characteristics. All these covariates are configured at season before salary measurement. We restrict the sample to have a minimum of 450 minutes played in the prior season so as to eliminate backup goalkeepers who do not feature in teams. As an alternative specification, we drop the team characteristics and include team fixed effects. Goalkeeper performance metrics were extracted from www.whoscored.com and include saves per shot, Who Scored goalkeeper rating and goals conceded by goalkeepers per 90 minutes played. We control for quality of defensive and midfield players by using an average of Who Scored ratings for midfield and defensive players on goalkeeper's team.

Results

Dependent variable is log salary (defined as basic pay excluding bonuses)

Table 3.*Results*

Variable	Goalkeeper rating	Saves per shot	Goals against per 90 minutes
Age	-0.038 (4.69)	-0.038 (3.75)	-0.038 (3.75)
Career appearances top 5 leagues/100	0.254 (6.91)	0.253 (5.65)	0.253 (5.73)
Appearances UEFA competitions/100	0.587 (4.59)	0.583 (3.07)	0.555 (2.88)
Career appearances other leagues/100	0.064 (1.61)	0.063 (1.29)	0.067 (1.37)
National team appearances/100	0.142 (1.32)	0.144 (0.92)	0.145 (0.93)
U20/U23 appearances/100	1.374 (3.54)	1.384 (3.04)	1.362 (3.05)
Minutes/1000	0.173 (7.21)	0.174 (7.46)	0.168 (7.36)
Goalkeeper rating	0.043 (0.68)		
Saves per shot		0.051 (0.28)	
Goals against			-0.174 (3.38)
Goalkeeper pass success			0.100 (2.77)
Team points/game	0.422 (6.24)	0.427 (6.09)	0.376 (5.22)
Log attendance	0.364 (5.74)	0.364 (5.74)	0.362 (5.68)
Spain	0.374 (3.60)	0.378 (3.64)	0.343 (3.36)
France	-0.170 (1.75)	-0.168 (1.74)	-0.196 (2.03)
England	0.723 (8.91)	0.726 (8.95)	0.700 (8.67)
Italy	0.199 (2.26)	0.200 (2.29)	0.178 (2.04)
N	700	700	700
N players	255	255	255
R ²	0.678	0.678	0.682

We would expect saves per shot to be a good indicator of goalkeeper performance as the goalkeeper is responsible for shots saved or shots not saved which then lead to goals. Saves per shot has been found to be a good predictor of salary for goaltenders in National Hockey League (Berri and Brook, 2010). Goals against conflates the performances of goalkeepers with those of defenders. If a goalkeeper concedes many goals, then this may be the result of a porous defense rather than poor goalkeeping. Moreover, the correlation between saves per shot in a given season with its lagged value is 0.6 while the correlation between goals per game and its lag is only 0.2, suggesting greater consistency for saves per shot. Consistency of performance

metrics over time is considered by Bradbury (2007) to be a prerequisite of a good performance metric.

Our results show that saves per shot and goalkeeper rating are insignificant predictors of goalkeeper salary. In contrast, increased goals against is significantly negatively associated with goalkeeper pay. Hence, measures which are not directly aligned with goalkeeper performance are associated with pay. Essentially, goalkeepers are penalized in pay for poor performances of their team mates. If we further add average defensive and midfield ratings to the model we find goalkeeper pay is positively associated with teammate ratings. So goalkeepers are rewarded in pay for good performances of teammates.

Recently, football reference (www.fbref.com) has published a measure of goalkeeper plus/ minus similar to the plus/minus measure in ice hockey. This is only available for two seasons in our data set. When we include goalkeeper plus/minus ($N = 180$) we get an insignificant coefficient on this metric. Our results are robust to quantile regression. Across all quantiles, saves per shot has an insignificant coefficient. Moreover, if we add goalkeepers' pass success to the model this also delivers a significant coefficient. Although there has been recent emphasis on goalkeepers' passing capability following the emphasis on this placed by coach Pep Guardiola at Bayern Munich and Manchester City, this is still a secondary task for goalkeepers behind prevention of goals from being conceded.

Our results suggest that the labor market for goalkeepers in European football is inefficient. Decision-makers focus on the most obvious measure (goals against). But this measure appears to be primarily about a combination of luck and teammates' performances. Hence, goalkeepers are being penalized in salary for something that is beyond their abilities. There are better measures available to assess goalkeeper performance, but decision-makers thus far are ignoring these when considering salary negotiations.

The effect of early career exposure to employers on future career outcomes: evidence from the National Hockey League

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Introduction

In nearly all industries, the future trajectory of a worker's career is most uncertain at the start of their career. The uncertainty regarding the ability of a junior worker to perform well in their industry is relatively high compared to senior workers. This uncertainty about the ability of the inexperienced worker can make it such that the employer cannot confidently rehire them and instead opts to hire a veteran worker for which more information is available. This paper investigates whether early career exposure of inexperienced employees to employers in their industry affects their later career outcomes in terms their probability of being rehired and the salary at which they are rehired.

Previous research shows that the precision at which the employer can estimate the ability of the entry-level worker has a positive impact on their (re)hiring probability. For example, Pallais (2014) performs a field experiment on an online platform where novice workers are randomly hired or not hired by the researcher. After the job is done, a signal of the worker's ability is posted on their profile. The randomly hired workers are subsequently more likely to be rehired by another employer and obtain higher wages. Stanton & Thomas (2016) find that agencies can signal that inexperienced workers are of high ability, improving their labor market outcomes. Peeters et al. (2021) show that information on worker ability is revealed on-the-job. Early career estimates of ability are noisy compared to later career estimates. They find that credit constrained firms can't afford hiring an unproven novice worker for fear of bankruptcy and choose to hire a proven veteran worker instead.

The overarching hypothesis behind this literature is that a signal of an entry-level worker's ability weakly positively influences their labor market outcomes. Getting the chance to demonstrate their ability, allows the employer to learn about their ability, which improves the future labor market outcomes of an entry-level worker.

In this paper I test this hypothesis using data from the National Hockey League (NHL). All NHL entry-level players (rookies) initially sign a three-year entry-level contract (ELC) after which the hiring team or another team can decide to rehire them. The degree to which rookies get to demonstrate their ability to perform at the NHL level is largely determined by the number of minutes they get to play during their ELC. The more minutes that the rookie plays, the more

precise is the signal of their ability. Specifically, I evaluate whether the aggregate time-on-ice (TOI) during a rookie's career influences their rehiring probability and the salary at which they are rehired. In order to get an unbiased estimate of this relationship I implement an instrumental variable strategy exploiting teammate injuries and the number of players under contract within a given position as a random source of variation in the aggregate time-on-ice between the rookie careers in my sample.

Data & Methods

There are three main ingredients to construct the data set for this analysis. Firstly, contract data is obtained from www.capfriendly.com and augmented using data from www.eliteprospects.com and www.prosportstransactions.com. This data shows when a rookie was initially hired and if they are rehired along with their post-rookie salary. Next, post-game reports are scraped from www.nhl.com in order to observe when and if a rookie plays. Finally, game-level injury data from ManGamesLost is added to the NHL data.

The analysis is performed in three steps. First, game-level time-on-ice is regressed on a variety of variables relating to the current stock of injuries and the number of players under contract at the team. The regression is structured as follows:

$$Toi_{itgs} = \beta_0 + \beta_1 * RookInj_{tgs} + \beta_2 * VetInj_{tgs} + \beta_3 * \#RookContracts_{ts} + \beta_4 * \#VetContracts_{ts} + \sum_k \beta_k X_k + \gamma_s + \varepsilon_{itgs}$$

In this regression the time-on-ice of rookie i playing for team t during game g in season s is regressed on the stock of rookie and veteran injuries of team t during game g . The stock of rookie injuries excludes any potential injury of player i . To control for the number of possible replacements available for the injured players I also include the number of rookie and veteran contracts on the books at the beginning of a team-season. X_k is a vector of controls containing a dummy for whether the player is an offense or defense player, the contract year that the rookie is in and whether game g is after the trade deadline of season s . After the trade deadline the rules for calling up players from the minor leagues are more lenient. X_k also contains interactions between the control variables and the injury and contract variables. Finally, I include season fixed effects γ_s . The results of this regression indicate that rookie and veteran injuries have a significant positive effect on rookie time-on-ice. To the contrary, more contracts are significantly associated with less time-on-ice. The r-squared of this game level regression is 0.058.

The predicted game-level time-on-ice estimates from the previous regression and the actual time-on-ice are aggregated to the rookie career level. The final step is then to perform

the instrumental variable analysis, relating aggregate (predicted) time-on-ice to the probability of being rehired and the post-rookie salary. To do this I use the aggregate predicted time-on-ice as an instrument for the actual aggregate time-on-ice during an entry-level career. This in-between step is required to avoid running a so-called *forbidden regression* (see Angrist & Pischke, 2009, pp. 190-192). The resulting IV regression is structured as follows:

$$Y_i(\text{Rehired}, \log(\text{PostSalary})) = \beta_0 + \beta_1 * \text{Defender}_i + \beta_2 * \text{TotalToi}_i + \text{LastRookieSeason}_i + \varepsilon_i$$

In this model rehired is a dummy variable for whether rookie i is rehired or not. Post salary is the post-ELC salary of the rookie in case they are rehired. These variables are then regressed on a dummy for being a defender (0 = offense), the aggregate time-on-ice and indicators for the last season of rookie i 's entry-level contract.

Results Instrumental Variable Regression

In total 736 rookies are included in the analysis, of which 588 (80%) are rehired. Aggregated time-on-ice is measured in tens of hours, which represents about half a standard deviation (21.5 hours). The left two columns show the OLS and IV estimates for the relationship between aggregated time-on-ice and rehiring probability. The IV estimate indicates that a ten hour increase in aggregated time-on-ice leads to a 9.3% increase in the probability of being rehired. The IV estimate is larger than the OLS estimate of 6.5%. However, the coefficients are not significantly different from each other. The first stage F-statistic for the IV is 25.53.

Table 1

Results instrumental variable regression

	<i>Dependent variable:</i>			
	Rehired		log(Postsal)	
	<i>OLS</i>	<i>instrumental variable</i>	<i>OLS</i>	<i>instrumental variable</i>
	(1)	(2)	(3)	(4)
Defender	0.017 (0.029)	0.013 (0.029)	-0.082*** (0.031)	-0.083*** (0.031)
Total Toi (10 hours)	0.065*** (0.006)	0.093*** (0.035)	0.294*** (0.007)	0.303*** (0.038)
Constant	0.691*** (0.041)	0.642*** (0.072)	13.218*** (0.045)	13.199*** (0.088)
Observations	736	736	588	588
R ²	0.135	0.112	0.785	0.784
First-Stage F-Stat	.	25.53	.	18.01
Last Season FE	Yes	Yes	Yes	Yes

Note: *p<0.1; **p<0.05; ***p<0.01

In terms of the post-rookie salary of the rehired players we see that a ten hour increase in aggregate time-on-ice is associated with an approximate 34-35% increase in post-rookie salary. The OLS and IV estimates are not statistically different from each other.

To conclude, after removing ability from the equation by using an instrumental variable strategy, I observe that the aggregate time-on-ice has a significant positive effect on the probability of being rehired and the post-rookie salary. This suggests that the degree to which an entry-level player gets to demonstrate their ability is crucial for their future labor market outcomes, regardless of their initial ability endowment and other endogenous factors.

League Level as a Factor of an Athlete's Second Professional Career

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Many athletes obtain popularity during their time in sports, but what they do after the end of their professional careers is something which is rarely well known. A sports career is a specific activity because it starts early in life, lasts relatively short, and the greatest successes usually occur when non-athlete peers are just starting to climb the steps of a typical professional career (Lenartowicz, 2009). What is more, at the time that these non-athlete peers are stabilizing their professional positions, sports people are usually in the final stages of their careers. Former players are then faced with the challenge of starting new work, often outside of sports, competing with mostly better-educated people. It is often difficult for an athlete to undertake sufficiently early actions necessary for retraining because sports success requires intensive training and participation in numerous competitions. Ending a sports career and moving to other professions is usually a demanding and stressful task (Brown et al., 2019; Carapinheira et al., 2019). It should also be added that despite the prevailing belief that professional athletes receive very high salaries, only a few of them are able to secure themselves financially for life.

In studies of the second careers of ex-athletes, the top performers are most often described (Carlson et al., 2015; Knights et al., 2016; Ramos et al., 2017; Torre, 2009), forgetting that many athletes play in the lower leagues and are reliant on sport as their main job. Therefore, the aim of this study was to check how the level of the league in which athletes competed affects the subsequent professional career of players later in life. The research group consisted of former basketball players who had played in four different league levels in Poland. The study was conducted at the turn of 2020/2021, and 301 people took part in it. Former basketball players were divided according to which league they had played for the highest number of years. The average length of a sports career was 10.13 years. If it happened that a player played the same number of seasons in two leagues, he was assigned to a higher league. In this way, 4 groups were created: the Ekstraklasa (47 people), the 1st league (88), the 2nd league (82), and the 3rd league (81). The Ekstraklasa is the highest level – fully professional, and the lower the league, the lower the level of professionalism in terms of finances and skills.

Players from better leagues usually receive higher salaries. The results show that for the vast majority of Ekstraklasa players, basketball was their main source of income – on average for over 11.62 years. In every lower league, this period was gradually shorter, up to the 3rd league where it was less than two years. These results indicate that in the lower leagues, you

can get financial compensation for playing basketball, but it is often not high enough to be a primary source of income. Detailed results are presented in Table 1. Differences in the average number of years of sport as a major source of income turned out to be statistically significant as indicated by the following ANOVA results: $F(3, 294) = 55.50$; $p < 0.001$; $\eta^2 = 0.36$. On the other hand, when it comes to the average age of ending a sports career, it is worth noting that it was much higher in the group of Ekstraklasa players. This is probably due to the fact that people playing in the lower leagues had to take up a different job over a time, which was often associated with the end of their sports career. However, the differences in the average age of retirement from sports did not turn out to be statistically significant ($p > 0.05$).

Table 1.

League level, the number of years of main earnings from sport and the age of ending career

League level	Average number of years of sport as major income	Average age of end of career
Ekstraklasa	11.62 (n=47)	30.54 (n=13)
1 st league	8.90 (n=88)	27.51 (n=43)
2 nd league	3.85 (n=82)	27.85 (n=53)
3 rd league	1.89 (n=81)	26.68 (n=59)

Source: own elaboration.

The study also analyzed whether the athletes, thanks to their performances on the court, were able to financially secure themselves for the rest of their lives. Most people answered “yes” to this question in the Ekstraklasa group – 39.1%, and in every lower league, this percentage was gradually lower. However, it is worth noting that even in a fully professional league, such as the Ekstraklasa, most players did not manage to save enough money to not have to work anymore. It turned out that the obtained value of the χ^2 is statistically significant: $\chi^2(3, N = 291) = 17.19$; $p = 0.001$; $\varphi = 0.24$. The differences between the observed and expected distributions are significant. Detailed results are presented in Table 2.

It is also worth considering whether playing at the highest level is conducive to getting an education. Among all analyzed groups, the lowest percentage of people with a higher education was in the Ekstraklasa group. This is probably because playing in a professional league requires a lot of commitment from players and they have little time to do other things. Also, they receive relatively high salaries, which is why they focus on the further development of their basketball skills. The league level turned out to be a factor that significantly differentiated the level of education. The obtained value of the χ^2 is statistically significant: $\chi^2(3, N = 298) = 13.15$; $p = 0.004$; $\varphi = 0.21$.

Table 2.*League level, financial security and education level*

League level	Financial security for the rest of life		Level of education	
	Yes	No	Secondary	Higher
Ekstraklasa	39.1% (n=18)	60.9% (n=28)	42.6% (n=20)	57.4% (n=27)
1 st league	20.5% (n=18)	79.5% (n=70)	20.5% (n=18)	79.5% (n=70)
2 nd league	12.7% (n=10)	87.3% (n=69)	18.3% (n=15)	81.7% (n=67)
3 rd league	11.5% (n=9)	88.5% (n=69)	17.3% (n=14)	82.7% (n=67)

Source: own elaboration.

The study also attempted to compare the current earnings of former athletes with those earned while playing basketball. It turns out that around 80% of players who played in the 1st, 2nd, and 3rd leagues, now receive higher salaries. This percentage is lower among Ekstraklasa players – 42.9%. It seems that it can be explained in several ways. Firstly, the average salary in the Ekstraklasa is higher than the average salary in Poland. Therefore, after the end of their sports career, Ekstraklasa players may find it difficult to maintain a similar level of income or to increase it. On the other hand, in the lower leagues, players did not receive that much money, so after switching to another job they were able to increase their incomes much more easily. What is more, players from lower leagues may also be favored by the fact that most of them have a higher education, which is also a favorable factor in the labor market. Detailed results are presented in Table 3. The differences are statistically significant, as evidenced by the following results: $\chi^2(9, N = 189) = 40.28$; $p < 0.001$; $\phi = 0.46$.

Table 3.*League level and comparison of current earnings with those during a sports career*

League level	Lower	Higher	Similar lever	Not applicable
Ekstraklasa	42.9% (n=6)	42.9% (n=6)	7.1% (n=1)	7.1% (n=1)
1 st league	4.7% (n=2)	79.1% (n=34)	11.6% (n=5)	4.7% (n=2)
2 nd league	0.0% (n=0)	81.7% (n=49)	10.00% (n=6)	8.3% (n=5)
3 rd league	4.2% (n=3)	79.2% (n=57)	8.3% (n=6)	8.3% (n=6)

Source: own elaboration.

In conclusion, it can be said that in this study, many interesting relationships were found. It turns out that the higher the league level in which a player plays, the later he ends his sports career. This is due to the fact that for the majority of the highest-level players, sport is their main source of income. It is also worth adding that almost 40% of Ekstraklasa players managed to financially secure themselves for the rest of their lives thanks to basketball. Interestingly, it is also possible at lower leagues, because every fifth former player of the 1st league was also able to secure himself financially. It is also very interesting that the vast majority of the analyzed group have a higher education – especially in the lower leagues. According to the literature on the subject, education has a significant impact on the position of a person in the labor market (Ionescu, 2012). The study also showed that around 80% of former players of the 1st, 2nd and 3rd leagues now receive higher salaries than when they played basketball. In summary, it can be said that the level of the league in which a given player plays has an impact on his second professional career.

Session XIV: COVID

Thursday, 26 August, 17:00 CEST

Evaluation of the economic impact of COVID-19 on the UK sport economic sector in 2020

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The Research Question

The current research is evaluating the economic effect of COVID-19 on the UK sport economy in 2020 using the latest official data and the UK Sport Satellite Accounts (SSA). The effect is considered in terms of direct impacts on a sport economy, without including indirect health and wellbeing impacts. This is the first evaluation of COVID-19 on the UK sport, using such methodology.

Theoretical background

The role of sport and its importance in economic development is well recognized amongst the international community. According to Eurostat (2020), in 2019, employment in the core section of sport (such as clubs and leisure centers) represented 1.37 million people in the EU, contributing to 0.69% of its total employment. The Pan-European Sport Satellite Account (SSA), a study commissioned by the European Commission (2018), reported that in 2012 sport related GDP was 2.12% of total GDP within the EU, and sport employed 5.67m workers, equivalent to a 2.72% share of total employment. The fact that sport occupies a greater share in employment than in GDP signifies that it is an efficient generator of employment. Under the conditions of the COVID-19 pandemic, these statistics acquire renewed urgency. As it is calculated in the study of the European Commission (2018), under the current economic structures and assuming that an increase of supply can be absorbed by demand, an increase of 1% in sport related GDP will be accompanied by an additional 1.3% of sport employment. Therefore, sport investment is effective at increasing employment and can be used as a policy tool for this purpose during, and after, the COVID-19 pandemic. The exact relationship between sport and the wider economy can be determined by the UK SSA and the so called 'Vilnius definition of sport' which underpins all the European SSAs.

Beyond this definitional and analytical framework of the research, there is a plethora of economic studies and SSAs elucidating the importance of sport in the UK and in Europe (Kokolakis, Gratton and Guenther, 2019). The size of the sport industry in the UK corresponds to 2.2 per cent of the whole economy's GDP (European Commission, 2018). During the first lockdown, the UK government subsidized 80 per cent of the wage bill, for

private companies to survive the lockdown. This temporarily prevented an employment decline in line with levels seen in GDP. According to the IMF forecast, during 2020, the UK economy declined by 6.5 per cent. All sport events that were cancelled or postponed contributed to such a decline.

Research methods

The quantitative analysis was based on the UK Sport Satellite Account's (SSA) structures. These were combined with results from published surveys about economic activity during the lockdown and international forecasts about the overall recession associated with COVID-19. In order to assess the impact of COVID-19 on the sports sector, data was taken from ONS (2020) which considers economic activity in the UK. Results, which serve as input to the current model, of business behavior during a lockdown, can be seen in the Table below:

Table 1:

Question: What is the current trading status of your enterprise?	
Share of industries continuing to trade, broken down by industry, UK, 23 March–5 April 2020	
Industry	Continuing to trade
<i>Professional, Scientific and Technical Activities</i>	96.2%
<i>Human Health and Social Work Activities</i>	95.6%
<i>Information and Communication</i>	94.4%
<i>Transportation and Storage</i>	92.3%
<i>Water Supply, Sewerage, Waste Management and Remediation Activities</i>	92.0%
<i>Administrative and Support Service Activities</i>	89.7%
<i>Education</i>	85.8%
<i>Manufacturing</i>	77.2%
<i>Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles</i>	72.8%
<i>Construction</i>	70.9%
<i>Accommodation and Food Service Activities</i>	<u>18.4%</u>
<i>Arts, Entertainment and Recreation</i>	<u>16.7%</u>
<i>All Industries</i>	<u>75.4%</u>

Such a Table, in general, outlines that during a lockdown, the economy declines by almost 25%, but the effect of the sectors that relate strongly with sport, such as 'Arts Entertainment and Recreation' is much stronger, declining by almost 83%. Such a model in conjunction with the structure of an SSA, can quantify the exact effect of COVID on the sport economy.

Mayor Findings

The main finding is that sport is affected disproportionately by the pandemic compared to an average economic sector. In the UK, during a lockdown sport is expected to decline by 65%-70%. This may be translated to a decline of over 20% during the year 2020. The table below illustrates the results of combining the results of ONS surveys with the SSA UK structure:

Table 2:

Industry	Lockdown reduction in sport (%)
<i>Sport clubs</i>	70%
<i>Accommodation – sport tourism</i>	100%
<i>Sport construction</i>	60%
<i>Food and services</i>	100%
<i>Retail of equipment (online)</i>	50%
<i>Management and administration</i>	40%
<i>Sport betting</i>	100%
<i>Domestic sport holidays</i>	100%
<i>International sport holidays</i>	100%
<i>Services (advertising, IT, insurance, etc.)</i>	40%
<i>Associations/charities</i>	40%
<i>Media</i>	40%
<i>Sport education</i>	15%
<i>Sport manufacturing</i>	30%
<i>Overall sport reduction during lockdown</i>	<u>65%-70%</u>

Conclusions

The sport sector suffered from the effects of COVID-19 not only because it took a direct hit in its operations, but also because much of the associated economic sectors, as they appear in an SSA, also suffered disproportionately. This was very apparent for the sectors: Accommodation, Food Services and Construction. The reversal of the trend of decline in sport is an urgent requirement for an overall economic recovery from COVID-19. This would have an important effect on employment, partly because of the nature of sport as an important generator of employment, and partly because sport is one of the most affected sectors of economy from the current pandemic.

Thinning out Spectators: Did Football Matches Contribute to the Second COVID-19 Wave in Germany?

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Overall Summary

This paper provides an ex-post analysis of football matches' contribution to the spread of COVID-19 during Germany's second infection wave in summer and autumn 2020. We find slightly positive effects from occurring professional football matches on newly registered cases. An upper boundary gives us that an additional match in a county on average raises the number of daily cases by up to between 0.52 and 0.91 cases per 100,000 inhabitants after three weeks. Hence, this on average implies an increase of the seven-day incidence per 100,000 inhabitants by up to between 3.6 and 6.4. We do not find qualitatively different results for a subsample of German top league matches with the strictest hygiene regulations. Most importantly, the found effect is mediated by the incidence level at the day of the match with very few infections for matches at a seven-day incidence below 25 cases per 100,000 inhabitants. As an underlying mechanism, we identify increases in the local mobility. Further, infections are not explicitly driven by higher occupancy levels. We finally show that the ban of away fans successfully restricts the spread of COVID-19 across county borders.

Background and Previous Literature:

Since early 2020, countries all over the world fight COVID-19 and its impact on their economy and public health. Even with vaccines as glimmer of hope, the pandemic's end remains uncertain. Hence, a persistent concern of businesses and policy makers is to find ways to adapt to the new circumstances and to reorganize public life. One of which is the reopening of football stadiums. As previous literature (Ahammer et al., 2020, Olczak et al., 2020, Parshakov, 2021, Wing et al., 2020) either has analyzed the effect of football matches on infections during the first wave with unrestricted attendance or used unreliable data from Belarus, there is a lack of knowledge in how far football matches increase COVID-19 cases under hygiene restrictions. Therefore, we study German football matches which have been conducted up to an occupancy level of 25% and mostly below a local incidence of 35 or 50 weekly cases per 100,000 inhabitants.

Empirical Approach:

To identify causal effects of football matches, we have to consider the staggered and iterating treatment of German counties in which football matches take place. Overall, there have been 660 matches with attendance between August and November 2020 in our sample. We account for the dynamic treatment by using event studies that test whether one additional football match per 100,000 inhabitants or one additional visitor per 100,000 inhabitants increases the COVID-19 cases throughout the next three weeks. In comparison to former literature (Ahammer et al., 2021, Olczak et al., 2021), this allows us to disentangle the effect of a single match and not just the average effect of a continuum of matches for which the specific timing sequence is not considered. By varying the outcome variable – for example COVID-19 cases of different age groups – we are able to study effect heterogeneity.

Main Effects:

We find that football matches significantly foster COVID-19 transmission. Performing a back-of-the-envelope calculation, we identify an additional match to be related to between 0.52 and 0.91 daily cases per 100,000 inhabitants. As expected, this effect realizes about 10 days after a match which can be explained by the delayed registration of infections and the incubation time.

Effect Heterogeneity:

To better understand under which specific circumstances football matches may be tolerable and how transmission affects the overall society with its different demographic groups, we perform heterogeneity analyses. In particular, we for example show that especially the population between 15- and 59-year-olds experiences higher case rates. There are only minor, short-run effects on the vulnerable age group of 60-year-olds and above. Nevertheless, we still find evidence for a penetrating transmission through different groups of society as there is no difference in infection effects between male and female – though more males attend matches. Also important, we show that there is a non-linear relation between the prevailing incidence level at matches and their effect. While effects for matches below an incidence of 25 weekly cases per 100,000 inhabitants are mild, effects grow substantially for higher incidences. Moreover, we check whether the abandoning of away fans stopped the transmission across county borders. Indeed, we neither find effects on COVID-19 rates in the away team's county, nor in neighboring counties or counties which are highly related with regard to inter-county commuting exposure. That there is no effect on away team counties also suggest infections to take place in stadiums or on the way to the arena instead of in private gatherings. In line with

this, we find that ghost games during this period did not cause infections, which can have only been considered to be caused by out-of-stadium infections.

Mechanism:

Considering the found results, it is intuitive to investigate the effect's origin – so which underlying mechanism causes higher COVID-19 cases. COVID-19 literature has often used mobility data to study the origin of incidence differences (Chang et al., 2021, Dave et al., 2020, Isphording et al., 2021). We follow this approach and identify that an additional football match causes the mobility reduction during 2020 in comparison to 2019 to be about one percentage point lower if a county hosts a football match. As increasing mobility is generally associated with more contacts and hence higher infection levels, these results support our results above. Note that we also do not find a robust mobility increase in away counties during match-time which further underlines that there seems to be a limited number of fans gathering to watch football outside of stadia. We interpret this as emphasizing the role of in-stadium infections in contrast to out-of-stadium behavior.

Policy Implications:

Our results prove that the government's mechanism to reduce attendance for matches in the presence of seven-day incidences per 100,000 inhabitants above 25, 35 and 50 were indispensable. Moreover, we conclude that considering incidence levels is of higher importance than occupancy levels as such have not shown to be driving infections – at least for low occupancy. We also tested whether infections reduced when considering the lockdown Germany launched in early November and we find matches' effects to be reduced. Still, there is a need for more research to find optimal governmental policy design, especially in the presence of new vaccines and the increasing relevance of mutations.

Session XV: Players

Friday, 27 August, 15:00 CEST

Is There a Loser's Curse in the NBA?

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Our study

The National Football League created the reverse-order player draft in 1936. The stated purpose of this institution was to give the teams that were the least successful in the previous season the first choice among the incoming talent from the college football ranks. Following this purpose, the most valuable choice in the draft should be the very first pick.

In 2013, though, Cade Massey and Richard Thaler cast doubt on that idea. Their study of the NFL draft indicated there was a significant loser's curse. When one compared the surplus value of each pick (i.e. the difference between the economic value of a player's production and their salary), the most valuable pick wasn't the first pick in the draft.

In this study we take the same approach in a study of the NBA draft. NBA teams are often accused of "tanking" seasons (i.e. deliberately building rosters that are not likely to win games) in an effort to secure a top pick in the draft. That strategy might make sense if the highest surplus values in the NBA draft existed at the top of the draft. We wish to see if that is actually the case.

Method and data

Our study begins by determining the economic value of a NBA player. The traditional approach follows from Scully (1974). But as noted in Berri (2018), Berri and Krautmann (2019), and Berri (2021), there are numerous problems with Scully's methodology. Consequently we will employ a method first noted in Berri (2014) and Berri (2016).

With the economic value of each player ascertained, we then calculate surplus value by comparing the estimated value to the player in their first two seasons to their first-year and second-year salaries. To date we have completed this analysis for the 2009 to 2019 season.

Results

The results (reported in the following table) indicate that the first pick in the draft does – on average -- have the highest surplus value. But after that, the expected pattern falls apart. The 2nd pick in the draft is only the 28th most valuable pick. The 4th pick is the least valuable pick.

These results suggest NBA teams have trouble determining who are the most valuable picks. Such results are consistent with the findings reported by Berri, Brook, and Fenn (2011),

Greer, Price, and Berri (2019), and Van Gilder, Haserd, Paulson, Walters, and Berri (working paper). This research indicated that teams tend to focus in the draft on factors not related to winning in the NBA (i.e. scoring totals and team wins in college) and downplaying or ignoring factors that better predict NBA productivity (i.e. shooting efficiency, rebounds, and turnovers).

Table 1.

Results

DRAFT PICK Most valuable (1-10)	Average Surplus Value	DRAFT PICK (11-20)	Average Surplus Value	DRAFT PICK Least valuable (21-30)	Average Surplus Value
1	\$ 7,604,718	10	\$ 4,142,363	13	\$ 63,870
3	\$ 7,393,286	12	\$ 3,608,854	25	\$ (330,599)
19	\$ 7,278,935	26	\$ 3,447,777	16	\$ (556,810)
23	\$ 7,042,792	20	\$ 3,428,741	9	\$ (575,895)
15	\$ 7,007,755	18	\$ 3,397,614	24	\$ (589,544)
22	\$ 6,898,767	29	\$ 3,284,943	28	\$ (776,600)
27	\$ 6,860,628	21	\$ 3,280,134	5	\$ (934,908)
30	\$ 5,492,770	11	\$ 2,327,120	2	\$ (1,954,981)
14	\$ 4,633,210	7	\$ 2,326,785	8	\$ (3,762,671)
6	\$ 4,474,105	17	\$ 1,748,936	4	\$ (6,268,414)

Perhaps nothing illustrates the issue with choosing players than what happened with the number one pick in the 2016 and 2017 draft. The Philadelphia 76ers were fortunate to land each of these two selections. With one of these picks they took Ben Simmons. With the other pick they took Markelle Fultz. These two players are the most valuable number one pick (Simmons) and the least valuable number one pick (Fultz) in our sample. And they were taken by the same team (and the same decision-makers).

The inability of teams to consistently pick well has resulted in what has been labeled the “the lottery treadmill”. Each year the teams that don’t make the NBA playoffs are put in a lottery. The lottery grants the top three picks in the draft to three of these losing organizations. Unfortunately, because teams don’t choose well they often end up taking – and playing --- an unproductive player. This causes the team to lose and puts them back in the lottery again, where again they choose poorly. For example, the Minnesota Timberwolves are the worst organization in major men’s professional team sports in North America (in terms of winning percentage). In the past few years they have added three number one picks in the NBA draft. Despite this influx of talent, Minnesota has won exactly one playoff game since 2004.

As we go forward with this research, we wish to go beyond just the first two years of an NBA players career and estimate surplus value for their first four seasons. It is possible these

additional years will alter our story. We suspect, though, that the NBA draft – just as we see in the NFL – doesn't quite do what the originators of this idea intended.

Nepotism in the NHL? An Analysis of the Draft, Games Played, and Salaries

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Nepotism in Sports

The National Hockey League has a history of various family members playing at the highest levels of professional hockey. The legendary Gordie Howe's sons played professionally and the Sutter family of brothers who played in the league is of legendary lore in western Canada. As more attention is paid to sons and other siblings of former NHL players, the question arises as to if nepotism is present in the NHL draft and during the family member's playing career. Specifically, are sons and other family members of former NHL players drafted higher than they should be and do these players receive more opportunities and higher pay than other players without a family lineage to the sport?

Nepotism is defined as "the practice among those with power or influence of favoring relatives or friends, especially by giving them jobs". Nepotism has been studied previously as it relates to sports. A study of NASCAR drivers from 1975-2005 found that being a son or brother has no impact on career length, although fathers ended their careers earlier (possibly to allow a son to extend their brand) (Groothuis and Groothuis, 2007). In Division-I college basketball in the United States, a study of nepotism found that teams with familiar relationships performed generally better than those without familiar relationships, with player-player having the largest positive effect on performance statistics and with coach-coach and coach-player having some minor positive impacts (Briggs, 2016). Australian Rules Football was also investigated for possible nepotism effects through their father-son rule, which allows teams to prioritize recruitment of former players' sons). The study found that prior to 2007, the father-son rule provided teams with 20% more value as these players outperformed other drafted players. In more recent years, however the league's bidding system has greatly reduced this advantage (Stewart, et al., 2016).

Nepotism and the NHL Draft

The null hypothesis in this study is that NHL teams exhibit a form of nepotism toward family members of former NHL players. Specifically, the null is that players with a family relationship to a former NHL player will be drafted higher than they should be. In addition, these players would be more likely to play more games than other similarly skilled players and,

if there is still nepotism after considerable time in the league, earn more in the open market than their peers.

This study investigates these possibilities through the study of the NHL draft, the subsequent games the player played in the NHL, and the maximum salary the player earned in their career after achieving unrestricted free agency. In all cases, a player with a familial relationship to a prior NHL player is compared to all other drafted NHL players across the years in the sample. The players included in the sample are those drafted between 2005 and 2010, with statistics considered until the end of the 2019-20 season. This allows for ample opportunity for the drafted players to reach unrestricted free agency to allow for assessment of their open-market salary. An NHL player reaches unrestricted free agency if their current contract ends after either 7 accrued seasons or they are 27 or older as of June 30.

The familial relationships investigated in this study are that of a son of former NHL player, a sibling of a former or current NHL player, a nephew of a former or current NHL player, and a cousin of a former NHL player. These relationships were investigated through various websites online including hockey data base and lists on Wikipedia to verify relationships.

The regression model took on different forms, but all investigated the same general idea related to the possibility of nepotism. In the first model, the dependent variable is career games played, while the independent variables consisted of draft position, draft position squared, control dummies for nationality and position, and dummy variables for the family relationship (if any). Separate models were estimated with Son, Nephew, Cousin, and Sibling included in the model and then further separated into these categories-only and combinations (i.e. the player was both a son of a former player and the brother of a sibling playing in the league). These models were estimated with a censored Tobit due to the lower limit of drafting players playing zero games. Beyond this specification, logit models were also estimated using three different games played thresholds as the dummy dependent variable which were 10, 50, and 100 games played.

Beyond the simple model of investigating games played for nepotism effects, we also thought it would be interesting to see if any nepotism effects could linger to where players' salaries are determined in the open market, after reaching unrestricted free agency. Using two variations of the dependent variable, the maximum salary earned and the maximum cap hit against the team, familiar dummy variables were included in the model (in addition to draft position, draft position squared, and national and position dummies) to determine if players with familial relationships earned more than their peers.

Results

The model results for the regression of games played revealed that sons of former players were not found to play more games than other players. On the other hand, siblings, nephews, and cousins were each found to play more games at the 5% level of significance or below. In the logit models of career games thresholds, siblings, nephews, and cousins were found to be more likely to reach these thresholds than other players. Sons, however, were found to be more likely to reach 10 games played (significant at the 10% level), but not at the 50 or 100 games mark. Overall, there is little evidence when using games played that sons of former players were offered much more of an advantage, other than at the very beginning of their career.

In terms of salary once players reached unrestricted free agency, sons of former players were not found to statistically earn more than their peers (the sign on the sons dummy was negative but insignificant), while siblings, nephews, and cousins of former NHL players each earned a statistically significant higher salary than other drafted players. Different combinations of familiar relationships yielded similar results (sons by themselves were not significant, but other familiar relationships were).

Overall, nepotism does not appear to be present in the NHL as sons of former players do not appear to play a statistically different number of games or earn a different salary than other players (with the exception of games played at the start of their career). However, having a sibling, uncle, or cousin that played in the NHL was found to lead to more games played and a higher unrestricted free agent salary than their drafted peers. These results actually show the opposite of nepotism for these familial relationships as they were drafted later than their peers and earned higher open-market salaries. It appears that being familiar with the process of being an NHL player, without all of the direct benefits a son might have, through being a brother, nephew, or cousin of a player that lived through the process yields gains to these players that the father-son relationship does not similarly produce.

A sports league model based on assignment of heterogeneously talented players to team rosters where roster talent and size matter

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Introduction

The literature on the economics of professional team sports leagues assumes almost ubiquitously that “only aggregate talent matters” (OATM), whereby the success of a team (usually one of two) in on-field competition depends only on the (perfectly divisible) aggregate talent it hires, at some uniform wage per unit of talent. Also, when the focus is an isolated league that faces no competition from other leagues for its specialized playing talent, usually thought of as a major North American league (MLB, NBA, NHL, NFL), OATM models assume a fixed aggregate supply of talent to the league. A number of models have been suggested, chronologically: the Walrasian fixed-supply conjecture (WFSC) model; the contest-Nash model; the strategic market game model; the Cournot model, and, most recently, the wage schedule model of R. Burguet and J. Sakovics (Bidding for talent in sport, *Economic Inquiry*, 2019, p. 85-102), hereafter B&S. With a focus on competitive balance, the models have provided many insights into the workings of a sports league determining, inter alia, an equilibrium wage per unit of talent and division of the aggregate talent supply between profit-maximizing teams (and hence competitive balance) with free talent market competition, and whether this outcome is optimal (in maximizing aggregate surplus). This paper provides yet another model of an isolated sports league with two profit-maximizing teams that addresses the same issues, but abandons both the OATM assumptions. Novel conclusions emerge.

The Framework

The model is based on a continuum of potential players and their strictly positive, heterogeneous talent levels in the relevant sport, which vary continuously across players. A strictly positive talent level means that a player with that talent level could contribute positively to the on-field effectiveness of a team, and its revenues. The set of potential players is relatively large, and many will not make the (isolated) league grade, earning instead an assumed uniform reservation wage outside the professional sport. Players need to be assigned to teams so the teams can engage in on-field competition, and the players assigned are the team’s roster; assumptions and conclusions in the paper also relate to the general assignment literature in economics, as well as the sports league literature.

Under OATM only the aggregate talent of its roster matters to a team; a roster with a large number of low talent players will provide the same on-field effectiveness as a roster with a small number of highly talented players if the aggregates are the same. Instead, we assume that the on-field effectiveness of a roster depends on the roster size as follows.

Team sports necessitate a minimum number of on-field players for each team so that they can engage in on-field competition; we assume this is $\underline{z} > 0$. Failure to attain \underline{z} by a team is assumed to imply that they cannot compete on-field; they earn zero revenue, as does the rival.

A roster of exactly \underline{z} is assumed to provide effective talent to its team equal to the aggregate talent of all players on the roster. In reality teams benefit from roster sizes exceeding \underline{z} , allowing on-field substitutions, cover against injuries and so on, but short of the benefits assumed by OATM, where adding 999 clones of a low quality minimum size roster would produce a world-beating 1000-fold increase in the team's effectiveness on-field. To avoid this, we assume that a roster of size up to $\bar{z} > \underline{z}$ provides effective talent equal to the aggregate talent of all players on the roster, but if roster size exceeds \bar{z} , the effective talent is the aggregate talent of only its best \bar{z} players; the rest add nothing. One can think of the best \underline{z} players on a roster as the "first team", and of the remaining players as the "bench". Then the first team and the bench do contribute their full aggregate talent to the team's effective talent, but only if the size of the bench does not exceed $\bar{z} - \underline{z}$; further additions add nothing. An alternative would be to assume that the first team still contributes its full aggregate talent, but the bench (of any size) contributes only some fraction of their aggregate talent; the alternative turned out to be less tractable.

Effective talents determine team revenues. If t_i is the effective talent of team i , its revenue R_i depends on, and increases with, $T = t_i + t_j$ (a measure of league quality), w_i (the team's win percentage $w_i = \frac{t_i}{t_i + t_j} = 1 - w_j$, which dictates competitive balance) and m_i (its exogenous market size). R_i is also strictly supermodular in (w_i, m_i) , a common assumption in the general assignment literature, implicit in most specifications in the OATM literature.

In all sports leagues there is an externality, reflected in the dependence of team i 's revenue on t_j . It would be no use to be the only team in a sports league, and the external effect is surely positive over some range. However part of the OATM literature assumes that team revenues depend only on win percentage and market size, with a globally negative external effect. The absence of a league quality effect seems implausible; it seems likely that revenues generated in a sports league depend on its quality, probably more so than on competitive

balance. Here w_i , m_i and T will affect revenues, and the case where T has a sufficiently large influence (precisely; enough to ensure a globally positive external effect) is the main focus.

The Findings

Optimality

What is the set of effective team talents that can be feasibly attained from assignment of players to teams? There are restrictions on this set, not found under OATM. For instance there is a maximum effective team talent \bar{t} , attainable from a roster of the globally best \bar{z} players. Similarly there are restrictions on the attainable league quality (which cannot exceed \bar{T} , the aggregate talent of the globally best $2\bar{z}$ players), and so also on win percentage and hence competitive balance. Full answers to this question are provided.

Which assignments of players to teams produce effective team talents that are optimal in maximizing aggregate surplus (the difference between total league revenue and the reservation wage costs of the players on the rosters)? A player-team assignment is said to entail a positive assortative match (PAM) if its roster-team assignment matches the bigger effective talent roster to the bigger market team, whose win percentage thus exceeds $\frac{1}{2}$. The supermodularity ensures that any optimum must entail a PAM, irrespective of the externality or its sign.

However with a globally positive externality and a sufficiently small reservation wage (assumptions maintained in the rest of the paper), any optimum entails also maximum league quality, so only the best $2\bar{z}$ players are assigned to rosters (Theorem 1).

Free Market Equilibrium

In B&S, the OATM assumptions continue but teams choose schedules of wage offers to individual players and players accept or reject to maximize their wage; the solution concept is a Nash equilibrium in wage schedules and uniform wages per unit of talent appear endogenously. The upshot is that there is an equilibrium which produces the optimal outcome, essentially the same as the early WFSC model, but as a Nash equilibrium, without reliance on the non-Nash conjectures of WFSC. This removes the stated motivation for the post-WFSC contest-Nash model and reduces the motivation for the subsequent models suggested.

Applying essentially the B&S equilibrium concept to our assignment model, we find equilibria that again produce the optimal outcome, but with league wages that are quite different (Theorem 2 and corollaries):

Optimality requires that only the best $2\bar{z}$ players are employed in equilibrium, but the worst of these players always earns an equilibrium wage equal to the reservation wage; if it was more, a team would fire some of its worst employed players and hire some of the

(discontinuously cheaper, but similarly talented) best unemployed players at the reservation wage. The wage distribution for employed players is anchored to the reservation wage at its bottom end. Thereafter the better employed players earn wage increments equal to their marginal revenue product; better players earn higher wages.

In all our equilibria, not only do better players earn higher wages they earn a strictly higher wage per unit of talent than worse players, unlike in the OATM literature including B&S where players earn a uniform wage per unit of talent.

A comparative static exercise shows that small increases in market sizes will increase wages of all employed players (apart from the anchor) and increase the extent of league wage inequality in the Lorenz sense.

In the limiting case (beyond the player talent heterogeneity assumed elsewhere) where the best $2\bar{z}$ players have the same talent level, they all earn the reservation wage in equilibrium, irrespective of the talent level. Higher wages for better players are due to talent inequality between players, not high talent levels generally.

Work-in-progress; it is hoped to add further findings eventually.

Session XVI: Performance under Pressure

Friday, 27 August, 15:00 CEST

Is Being Slightly Behind at Halftime Good? Loss Aversion and Diminishing Sensitivity in Professional Team Sports

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Motivation and Theoretical Background

There is a large body of literature, which is concerned with the impact of tournament incentives on motivation and performance (Lazear & Rosen, 1981). One concern with tournament incentives, however, is that people who are losing may get discouraged and reduce their effort (Fershtman & Gneezy, 2011). Their model predicted that participants in a contest would sharply reduce effort supplied when the perceived value of winning the contest was reduced, even in the presence of social stigma associated with the effort reduction. However, whereas being far behind might lead people to quit, the impact of losing by only a small amount is less clear. This question was, for example, addressed by Berger and Pope (2011). They asked how people respond when they are only slightly behind and whether losing by a little actually could increase motivation and performance?

Although finishing part of a project or scoring a goal in sports requires the same amount of effort whether a person or team is ahead or behind, goals can act as reference points (Heath et al., 1999). Consequently, position relative to a goal can influence motivation in a manner consistent with prospect theory's (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992) key predictions: (a) reference points, whereby people categorize outcomes as gains (success) or losses (failure) depending on where they fall relative to a particular standard; (b) loss aversion, whereby losses are more painful than gains are pleasurable; and (c) diminishing sensitivity, whereby outcomes have a smaller marginal impact as they move further from the reference point. Loss aversion suggests that compared to people who are above their goal by a similar amount, people who are below or behind their goal will work harder because they see their performance as a loss. Furthermore, because of diminishing sensitivity, people who are slightly below their goals should work harder than those for whom the goal is further away (Heath et al., 1999; Kivetz et al., 2006)

This project addresses the research question how trailing by a few scores in team sports affects motivation and performance in both the laboratory and the field. It is closely related to the studies from Berger and Pope (2011), who analyze more than 18,000 National Basketball Association (NBA) basketball games and 45,000 collegiate basketball games, and Klein

Teeselink et al. (2020), who analyze more than 145,000 games from American Football, Australian Rules Football, Rugby, and Basketball. The empirical analysis in this project transfers this study into a different sport context by using data from European team handball leagues. Overall, the dataset consists of 10,738 games played in the top tier leagues of five countries (Germany, Spain, France, Denmark, Sweden).

Empirical Strategy and Methods

The empirical analysis focuses on halftime for a number of reasons. First, feedback helps people adjust their effort to meet their goals (Locke & Latham, 2002), and the break provides a chance for all players to be aware of the score. Second, time to consider one's relative position should invite reflection and increase the salience of the reference point. Third, especially in situations where performance depends on members working together, increased performance is more likely if everyone understands where they stand relative to the goal. Overall, because of the sustained break, halftime provides an ideal opportunity for all team members to know their position relative to their opponent, reflect on it, discuss it, and become motivated.

In basketball both team time-outs as well as quarter breaks might provide similar opportunity to reflect, so it needs to be considered to analyze the effects of these breaks too. This analysis, however, sticks to halftime as trigger for the feedback and reflection for two main reasons. First, team handball games are not organized in quarters like basketball but in half times like soccer. Like basketball, team handball allows team time-outs taken by the coaches (one per team per halftime). As hypothesized above, these regular time-outs could also provide the opportunity for the teams to reflect on the relative position compared to the opponent. However, the timing when the coaches call the time-outs might be strongly affected by the state of the game and, hence, might be endogenous (Berger & Pope 2011, p. 818). Since the chosen method requires exogeneity of the treatment, only the halftime has been chosen as treatment.

Team handball has been chosen to test the generalizability of Berger and Pope's (2011) results for several reasons. First, this sport is mainly played in Europe and is the second most popular team sports for men and women in many European countries. This provides a test of a slightly different cultural setting. Second, the sport is different but shows some key similarities to basketball in order to be a comparable case. Like basketball, team handball is a high scoring game with a combined number of scores between 40 and 80 scores/goals per game. In a European setting, soccer would seem an obvious choice for an analysis, but it reveals some serious caveat with respect to analyzing the stated research question, because of its low scoring nature. A one goal difference at half time in soccer is a much more substantial gap than a one

goal differential in team handball or a one-point differential in basketball. Thus, the behavioral effects might be different.

To identify the causal effect of losing at halftime on subsequent performance, a Regression Discontinuity Design approach has been chosen. Regression Discontinuity Designs are typically used in situations where the treatment status is determined by whether an observable variable (the forcing variable) is above or below a known threshold. Following Berger and Pope (2011), we are interested in the case where teams are “treated” with feedback that indicates that they are losing. The forcing variable is the score difference at halftime, and teams are treated if the forcing variable indicates that the team is losing at halftime. The basic version of the model can be described as follows:

$$hwin_i = \alpha + \beta LHT + \delta SDHT + \gamma X_i + \varepsilon_i. \quad (1)$$

$hwin_i$ is a dummy variable which is equal to one if the home team won game i . LHT_i is our variable of interest and a dummy variable, which is equal to one if the home team was trailing by one or more goals at halftime. $SDHT_i$ is the forcing variable which indicates the goal difference between the home and away team at halftime. X_i is a matrix of control variables.

The dataset used in this analysis consists of individual game data (full-time and halftime results) from European team handball leagues (top tiers) in Germany, Spain, France, Denmark, and Sweden. The observation period runs from the 2009/10 season to the 2018/19 season – except for Denmark, where the dataset starts with the 2010/11 season. Overall, the dataset consists of 10,738 games played in the five leagues. The largest sub-dataset is from the German league with approx. 3,000 games, while the Danish dataset consist only of approx. 1,650 games.

Preliminary Results

The results for European team handball show weak evidence for the existing of a behavioral economics effect as it can be shown that teams on the left side of the discontinuity are more likely to win than teams directly on the other side. However, it has to be mentioned that the results for the overall sample as well as for the individual regressions for Germany and Spain only reveal weak significance on the 10-percent level. This is in contrast to the (mostly) highly significant results shown in Berger and Pope (2011). Furthermore, the coefficient of the variable of interest is insignificant for the Danish subsample.

Presenteeism when employers are under pressure: evidence from professional soccer

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Motivation

Why do employees attend to work while their health status would give them reason to stay at home? This phenomenon, often referred to as 'presenteeism', has received growing attention over time in different research areas such as occupational medicine, social psychology, and various fields of economics. There is evidence that, for instance, employment conditions, workers' attitudes, and companies' absence policies are important drivers of presenteeism (Hirsch et al., 2017; Lohaus and Habermann, 2019).

From an employer's perspective, even apart from infectious diseases, presenteeism is a double edged sword. While reduced productivity is better than zero productivity due to sickness absence, it bears the risk of health consequences and longer absence times afterwards (e.g. Bergström et al., 2009; Hansen and Andersen, 2009).

There is also reason to believe that the net utility from presenteeism is not constant over time. This is because worker's absence may have little consequences in 'quiet times' but this could change when the employer is under pressure. One may think of financial auditors in the deadline phase.

So far, this interplay between presenteeism and employer dynamics has not been fully understood. In this study, we try to close this gap using data from professional soccer. Depending on factors like a player's importance for the team and the overall level of absenteeism, players may return earlier from recent injuries when their team needs them. There is reason to expect that the underlying motives for this behavior (e.g., job market signaling, career concerns, and peer pressure) are the same as in less specific labor market segments.

Methods

We use data from the top soccer leagues in Germany (Bundesliga), France (Ligue 1), England (Premier League), Spain (Primera Division), and Italy (Serie A), covering ten seasons from 2010 to 2019. The focus is on absenteeism of players due to medical conditions ('injuries') such as a pulled hamstring, a traumatic brain injury, and gastroenteritis.

We exploit the dynamics of a season in professional soccer. In soccer, the first half of a season (July to December, 'the reference period'), starting with a preparation period, is characterized by a fixed number of games either in the national league, the first round of the

national cup(s), and (if qualified) the group stage of European competitions (i.e., UEFA Europa League and UEFA Champions League). The workload is predictable and teams can adjust their personnel decisions to it. In the second half of a season (January to June, ‘the relevant period’), however, the number of matches varies according to a team’s success in the knockout phase of the cup competitions. This is the critical phase of a season where teams are under pressure and the workload is far less predictable.

The basic idea underlying our research design is to calculate average recovery times per injury category based on data from the reference period and then to analyze how recovery times vary with respect to a team’s number of games in the relevant period. Put differently, in our setting, presenteeism means that a player returns from an injury of a certain type earlier than expected.

After preparing the data, we are left with 7,007 observations from the January to June period assigned to 259 different types of injuries with an average duration of absence of 25.53 days and a standard deviation of 33.73.

We document the average treatment effect of having a high workload on the probability of an early return (= 1 if the recovery time (in days) is at least 1 day shorter than expected, and 0 otherwise) from an injury i by estimating the following equation:

$$early\ return_{i,j,k,t,c} = \beta_0 + \beta_1 high\ workload_{i,j,k,t} + \phi' \mathbf{X}_{i,j,k,t} + \zeta_k + \pi_t + \rho_c + c_{i,j,k,t,c}, \quad (1)$$

where *high workload* is 1 if the number of national and European cup games played by team k in the relevant period of season t is in the fourth quartile, and zero otherwise. $\mathbf{X}_{i,j,k,t}$ is a vector of team-, injury-, and player specific characteristics like market values, squad size, number of injuries, and contract length.

Major findings

We find that players who sustained an injury in the second part of the season and who play for a team ‘under pressure’ have a higher tendency to return earlier than expected: the probability of an early return increases by 11.3 to 6.6 percentage points if a team’s workload in the relevant period is high. For different degrees of an early return, the estimates are illustrated in Figure 1 below. This effect is robust to player fixed-effects estimations and a non-linear modelling of the dependent variable. Moreover, an early return is more likely when (i) it is less easy to replace the absent player and (ii) when the player is a key position player (defined by his relative market value).

Concerning the potential cost of presenteeism for players and clubs, we focus on the effect of an early return on future injuries. We find robust evidence that presenteeism comes at the cost that an early return significantly shortens the time until the next injury.

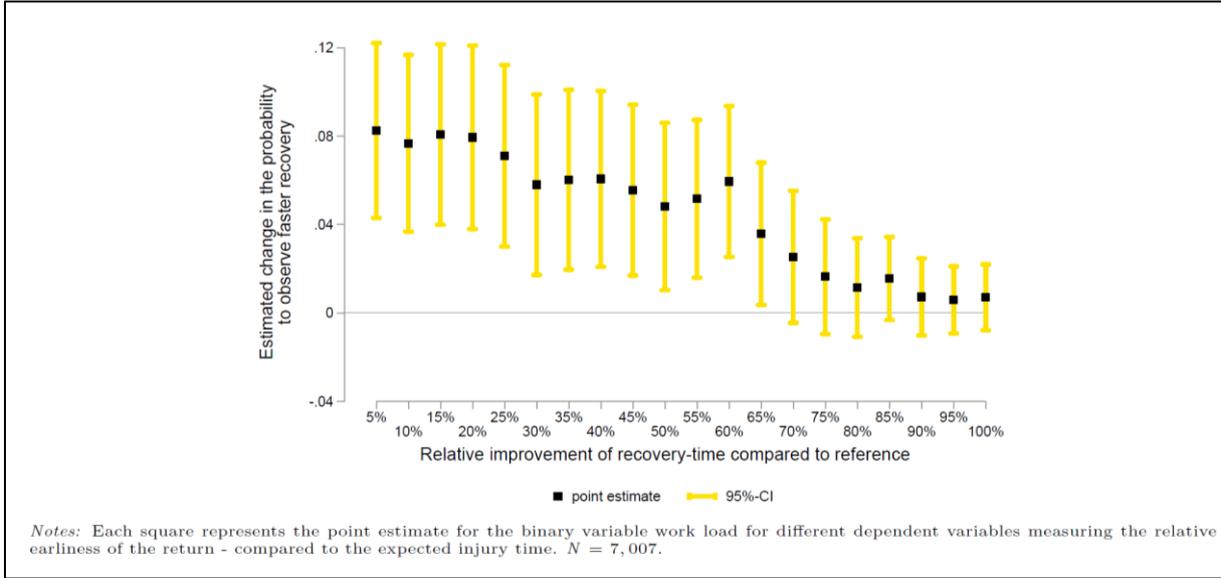


Figure 1.
Number of games on probability to return from injury earlier

What's the point? The effect of social pressure on shirking in the face of adversity

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Introduction

The outbreak of the pandemic in early 2020 has had dramatic and unprecedented impacts on the NBA. League activities were stopped and matches were postponed. When league play eventually resumed after the NBA bubble in the season of 2020/21, due to COVID-19 regulations, no or only a limited number of fans were allowed into the stadiums. Never before had there been a time in NBA history, in which teams regularly played without a crowd. Thus, the outbreak of the Coronavirus and the associated regulations can be considered a natural experiment, as they were exogenously imposed on the league. The effect of this natural experiment is drastic:

The phenomenon of home court advantage in professional sports has been established in the sports economics literature for numerous decades (e.g. Schwartz and Barsky (1977)). However, during the COVID-19 games, this advantage essentially vanished (Reade, Schreyer & Singleton, 2021; Fischer & Haucap, 2020). Some studies show that the home advantage even reversed during the ghost games (Tilp & Thaller, 2020). Naturally, the question arises, whether the absence of a crowd has other impacts on the outcome of games. For European football, Bryson et al. (2021) found effects regarding referee bias potentially related to the absence of a home court advantage but found no significant difference regarding match results such as goal differential or total goals. However, the NBA made headlines at the beginning of the 2020/21 season such as: “The NBA's rushed 2020-21 season has brought increased blowouts, and that's just the start” (Rohrbach, 2021) and “Analysis: Amid pandemic, NBA blowout epidemic also happening” (Reynolds, 2021).

Thus, the purpose of this study is to analyze how team performance in the NBA changes when no fans are present in the stadium, particularly in the context of shirking when facing adversity in terms of a trailing considerably during a game. The importance of our findings is twofold. First, games that are decided with a large margin do not offer a great experience for the viewers (Buraimo & Simmons, 2009). Second, our findings can be extrapolated from sports and can be applied to settings in which an agent faces adversity, but is not directly publicly observed.

Conceptual framework and literature review

The concept that performance can be affected while being observed by an audience was first put forward in the seminal paper by Zajonc (1965). In team sports, the effect manifests in the form of the aforementioned home court advantage in numerous ways, e.g. minutes of injury time (Garicano et al., 2005), penalties awarded (Nevill, Newell & Gale, 1996), number of fouls (Nevill, Balmer & Williams, 2002) and in win percentage (Pollard, 2006). Most of these effects are believed to be directly linked to the presence of a supportive home crowd (Cross & Uhrig, 2020); Reade, Schreyer & Singleton, 2021); Bryson et al., 2021).

During the 2020/21 season, zero or only a limited number of fans have been allowed into the stadiums, thereby drastically altering the environment of NBA and sports games in general (Price & Yan, 2021). At the time of writing, there are no studies yet that analyze the impact on NBA games, but there are a few studies that consider European soccer matches (Reade, Schreyer & Singleton, 2021; Bryson et al., 2021; Scoppa, 2021).

This study takes a different angle and analyzes the effects of the COVID-19 related regulations in the NBA in the context of shirking. The concept of shirking was first put forward by Shapiro and Stiglitz (1984) and describes a situation, in which a worker does not provide 100% effort on his job. It presents a principal-agent problem and has often been analyzed in the context of worker incentives (Carmichael, 1989) and contract design (Zhu, 2013). Shmanske (2011) shows that NBA players supply optimal effort with no dynamic feedback from one game to the next. In their analysis of the MLB, Krautmann and Donley (2009) find that players signing multi-year contracts create less value than they were expected to generate.

The study contributes to the literature in a couple of ways. First, it adds to the existing literature on shirking by looking at in-game behavior of players and the role of social pressure. Thereby, it sheds further light on the way that a crowd (or the absence thereof) can impact team performance.

Methods

The data of this study was scraped in R, using the popular package `nbastatR` (Bresler (2019)), which makes use of NBA data using the league's Application Programming Interface (API). In R, we gathered play-by-play data for each regular season game from the seasons 2010/11 to 2020/21. The collected sample includes play-by-play data on 12,382 games, resulting in a total of 5,671,152 play-by-play events. We then filter out all events that do not result in a change of the marginal score ("marginScore") between the two teams. The final play-by-play sample includes 1,414,414 play-by-play events.

Additionally, we also gathered game-level data (teams, location, final score, etc.) from the same set of games. Each game is uniquely identified via a game ID, which allows matching of the game-level data and the play-by-play data.

In order to identify blowout games, we looked for those games, in which the margin score was more than 20 at least once in the first half (before the fourth quarter) and more than 30 at least once in the second half (in the second quarter). We also calculated season-level average margin scores and their percentiles, but we believe them to be diluted by garbage time (Narciso, 2018; Ciesielski, 2020). We believe that looking at in-game scores, rather than the final score, circumvents the potential garbage-time issue. We perform the analysis for each season, as well as for only the first 400 games of each season. The reason is that, as stated above, at the beginning of the 2020/21 season, no fans were allowed into the stadiums. Also, we thus control for the possibility that at the beginning of the season, teams generally need to adjust to the circumstances (e.g. a new roster), which's effect would go in the same direction.

Major findings

Preliminary results show an increase in blowout-games, meaning that a team has been down by at least 30 points at some point during the game, by about 3% points. The finding remains holds true when considering the entire season, as well as looking at only the first 400 games. Additionally, we find an increase in games in which a team has been down by at least 20 points at some point in the first half and then happens to be down by at least 30 points at some point in the second half. The same holds true for games in which a team has been down by at least 20 points at some point before the fourth quarter and then happens to be down by at least 30 points at some point during the fourth quarter. We interpret this finding as an increased likelihood of teams to let themselves down instead of tightening the score and thereby allowing their opponents to run up the score. In the next step, we are looking to match play-by-play and season-level data with attendance data. Then, we want to test the significance of fan attendance on match outcomes using a fixed effects model.

Session XVII: Demand II

Friday, 27 August, 15:00 CEST

Factors attracting fans to different standings in the stadium: Evidence from Disaggregated Data

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Introduction and Theoretical Background

A football fan has habitually many options when purchasing a ticket for attending a match. Different standings, seats, fixtures and hospitality packages – among many other factors – definitively influence the consumption process of a football ticket. However, most of the previous research inspected the demand for tickets using aggregated data (Schreyer & Ansari, 2021), which implies a common behavioral intention among all fans.

There are, indeed, some few attempts trying to deal with potential differences between groups of fans. Some works, for instance, exclude the season ticket holders from their equations (Bond & Addesa, 2020), while others try to predict the season ticket holders' behavior itself (Schreyer, Schmidt & Torgler, 2018). On the other hand, some research pursued to inspect the differences among group of fans: Allan and Roy (2008) evidences that TV broadcast would reduce the ticket demand for pay-at-the-gate home supporters, but it would not affect season ticket holders, as well as Dobson and Goddard (1992) indicate differences in the demand for standings and seated attendance – where the former is attracted by the significance of the match and the current performance of the team, while the latter is committed with the club's historical record.

One of the biggest methodological challenges that researchers face when modelling stadium attendances is the lack of disaggregated data. Nonetheless, such data has been possible to collect on Brazilian football. Therefore, the current research aims to shed light on whether the determinants of live demand vary according to the sector (standing) of the purchased ticket.

Methods

We focus our study on the first tier of the Brazilian League due to the availability of data. That tournament is played in a double-round robin design as most of European domestic competitions. For our research, we inspected the home matches played in a single stadium, Maracanã, one of the biggest and most iconic in that country. This choice – for a single stadium – is made for a homogeneous sample selection. In fact, one could not compare the behavioral intentions of fans when stadium characteristics (and stadiums themselves) are different. We inspected the home matches of Flamengo and Fluminense from 2014 to 2019.

The econometric approach consists in Ordinary Least Square (OLS) regressions with home team and season fixed effects. The dependent variable is the attendance a on each sector s for each club i on season t . The regression actually models one individual equation for each sector for comparing their determinants. The explanatory variables are: the logarithm of the ticket price (p), dummy for discount (d) which equals 1 when the ticket has been bought with 50% of discount (0 otherwise), and the Uncertainty of Outcome matrix (UO), which in the first model includes the home win probability (hwp) and in the second one adds its squared term (hwp^2). Control variables (CV) include the weekdays (w) and a specific dummy for each away team (j). The general model is following:

$$a_{sit} = \beta_0 + \beta_1 p_{sit} + \beta_2 d_{sit} + \delta UO_{sit} + \varpi CV_{sit} + \varepsilon$$

Main Results

Table 1 shows the outputs of regression models. Firstly, we observe that Fluminense presents a significant lower demand for tickets than Flamengo, which has been previously suggested by descriptive statistics. However, the empirical results indicate a higher demand from Fluminense' supporters in the South sector of the stadium.

The results show evidence that the explanatory factors impact differently the tickets consumption according to the sector. Tickets price, for instance, is negatively associated with lower demand for tickets in the sectors East and North, while in others it seems to be irrelevant for the fans. The impact of a 50% discount in tickets is, as expected, positive attracting supporters. An unusual result is shown: significant negative impact of discount in North sector. However, the North sector hosts supporters of the visiting team. Thus, we ran an alternative regression adding the dummy to reflect away fans on that sector and the statistical significance of the discount vanishes.

The outputs also indicate relevant findings regarding the impact of the Uncertainty of Outcome. In the sectors East, West and South, supporters are highly interested in the home win probability – it is, they do attend more as much favorite the local team is. Nonetheless, one may note the significant quadratic relationship between home win probability and demand for tickets in the North sector: it implies that those fans are attracted by both higher or lower chances of winning. As mentioned above, this sector (North) is where away fans are located, therefore we assume that the left portion in the demand curve is driven by the away fans. Finally, the output reveals that all the factors are irrelevant for consumers in Maracanã Plus – a VIP area. This result may suggest that those fans are not influenced by economics (i.e., price and discounts) or traditional sportive determinants (Uncertainty of Outcome) and, therefore, may require further specific analysis.

This research is under development. Our further steps include the addition of match-specific characteristics (i.e., match quality, competition intensity, clubs' market value) as well as other explanatory variables that could be gathered.

Table 1.*Regression outputs of stadium demand models by sectors.*

VARIABLES	East	East	West	West	North	North	South	South	M. Plus	M. Plus
logprice	-0.289***	-	0.0959	0.0959	-	-	-0.0982	-0.100	-0.0648	-0.0709
		0.294***			0.786***	0.779***				
	(0.0932)	(0.0932)	(0.366)	(0.368)	(0.178)	(0.177)	(0.156)	(0.156)	(0.152)	(0.153)
1.Discount 50%	0.605***	0.604***	0.649*	0.649*	-0.362*	-0.348*	0.503***	0.502***	0.0610	0.0609
	(0.130)	(0.130)	(0.344)	(0.346)	(0.190)	(0.189)	(0.171)	(0.171)	(0.161)	(0.161)
Home Win Prob	1.671**	-4.095	5.892**	6.034	-0.284	-	5.502***	2.524	0.405	-4.120
						16.34***				
	(0.818)	(3.810)	(2.930)	(19.29)	(1.170)	(6.016)	(1.057)	(5.228)	(0.965)	(5.093)
Home Win Prob ²		5.383		-0.151		15.13***		2.832		4.260
		(3.474)		(20.41)		(5.564)		(4.870)		(4.708)
1. Fluminense	0.0638	0.113	-1.083	-1.080	-	-	1.479***	1.502***	-	-0.590**
					1.282***	1.200***			0.622***	
	(0.179)	(0.182)	(1.319)	(1.371)	(0.227)	(0.228)	(0.221)	(0.225)	(0.227)	(0.230)
Constant	6.894***	8.398***	3.716	3.684	8.738***	12.91***	3.596***	4.368**	5.051***	6.449***
	(1.139)	(1.496)	(3.497)	(5.563)	(1.403)	(2.075)	(1.326)	(1.876)	(1.643)	(2.255)
Weekdays	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Away team FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,110	1,110	168	168	591	591	673	673	379	379
R-squared	0.090	0.092	0.218	0.218	0.221	0.232	0.176	0.177	0.221	0.223

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Why Are They Interested in Watching Professional Handball? – Survey Findings on German Handball Attendance

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Background and research question

Handball in Germany has a long tradition and has been popular for 100 years. Even though in particular the men's national team is the international flagship of the German Handball Association (DHB). The men's 1. Division (HBL) has an average of over 5000 spectators. At the same time, there are big differences in the attendance demand between the clubs. While the home games of the successful team for years THW Kiel are regularly sold out with 10,285 spectators as well as other top teams like Rhein-Neckar Löwen (7,932), SC Magdeburg (6,430) or SG Flensburg-Handewitt (6,060) increase the average, teams from the bottom of the table like SG BBM Bietigheim attract less than 3,000 spectators (DKB Handball-Bundesliga, 2019).

Low attendance numbers in the top league can be classified as a structural weakness with regard to marketing. Because the sale of tickets leads to direct income and is a significant share of the overall team budget. Especially for clubs with limited resources. In addition, rising attendance demand can also support follow-up products such as sponsoring cooperation, merchandising products, or TV rights (Dietl, 2010; Reichel, 2020). For that reason, especially teams, or team sports in general with low attendance demand, should try to attract spectators to improve their market position and drive professionalization. Against this background and to initiate targeted management measures Borland and MacDonald (2003, p. 480) confirm: „Understanding about the nature and determinants of demand is arguably the most important empirical issue in analysis of professional sporting markets”. Therefore, the aim of the present paper is to determine the main factors influencing attendance demand in HBL. Based on the results, implications for measures to increase demand will be discussed in order to further exploit the marketing potential of handball in Germany

Literature review and theoretical framework

Research on fans and attendance demand in professional sport can be identified as one of the most extensively researched field in sports economics (see, e.g., Borland & Macdonald, 2003; Garcia & Rodriguez, 2002; Villar & Guerrero, 2009). A major focus of the studies is to identify factors influencing attendance demand in team sports. Besides common consumption determinants, like socio-demographic and economic factors (e.g., age, gender, income, price),

typically sports related (e.g., suspense in terms of the famous uncertainty of outcome) and non-sports related quality components (e.g., date of fixture, weather, stadium comfort) were found empirically significant (Budzinski & Feddersen, 2016). However, econometric studies nearly exclusively focus on the most popular team sport respectively sport leagues with high attendance and leading market positioning (e.g. Czarnitzki & Stadtmann, 2002; Dobson & Goddard, 2001; Rottmann & Seitz, 2008). Not much is known on possible peculiarities of mid-level professional or developing team sports with lower attendance, except some studies for women's football in Germany (Klein & Zimmermann, 2015; Meier, Konjer, & Leinwather (2016); Reichel, 2020). With regard to professional handball in Germany, little research can be found. The only study by Mielke (2010) analyses the more efficient marketing of women's handball. The general determinants of demand can basically be related to top-level male handball, but empirical studies are necessary to find out how strong and important the respective factors are to attendance in male handball in Germany.

Data and method

The data was gathered by a multi-purpose attendance survey (assisted paper-pencil) placed on four matches of the men's 1st Division (HBL) (N=587). In order to obtain a response from fans of different teams, with different sporting levels and placements in the table as well as various budgets, different survey locations were specifically selected. With this purpose from 9 May through 23 May 2019, the questionnaire was handed out to attendance at the matches SG BBM Bietigheim against TSV Hannover-Burgdorf (N=84, 14%), SC DHfK Leipzig against Bergischer HC (N=160, 27%), HC Erlangen against SG BBM Bietigheim (N=222, 38%) and SC Magdeburg against VfL Gummersbach (N=121, 21%). The multi-purpose questionnaire covers items on general media behavior in everyday life and in particular to handball, fan identification, interest and behavior in handball, reported attendance, attitudes towards the league and club governance as well as sociodemographic information. The attitudes towards fan-specific factors are measured by item batteries based on literature-based statements.

While the gender (with 49% female, 50% male and 1% diverse) as well as income distribution (M=3.8, i.e., 2001-3000€ monthly net income, with 6 income groups) in the sample is quite balanced, better educated respondents predominate (43% with academic degree). Considering the age, the majority of the sample (22%) is 50-59 years (with M=44.1).

37% are season-ticket holders, 5% each are a club member as well as organized in fan club, around a third is or was an active handball player (37%) and, at least, 42% may be categorized as committed and passionate fan of a specific team.

Hence, the data can be qualified as a clustered convenience sample which captures active handball attendance while exhibiting enough variance by covering also control groups in order to detect significant relationships as to the research question on attendance. For the key analysis, (ordered) Logit regressions will be run on constructs of dislike towards attend handball matches in 5-point Likert scales, considering a set of about 80 explanatory variables. Full and reduced models with index variables on key determinants proposed by the theoretical framework (e.g., attendance, fan identification, interest and behavior in handball) as well as ordered and binary variants will be tested for robustness checks. However, the econometric analyses are not yet finalized. They will be presented at the conference. Therefore, in this abstract, the early descriptive findings are discussed.

Results and discussion

The results of the multi-purpose survey are summarized as follows: Identification with the club, Quality of the game, Competitive balance, Importance of the single game, Non-sports related quality components, Price and income elasticity, Substitutes, Socio-demographic and social factors. The identification with a club and the success of a team are confirmed as the main motivations for attendance demand, which can be reinforced by the success and league membership of a team. The majority of respondents identify strongly with their club ($M=3.7$, i.e. more likely agree for a 5-point Likert scale), with significant differences between SCM attendance and the three other clubs. With decreasing ranking of the teams in the table, the identification of the surveyed attendance decreases linearly (SCM, HCE, SC DHfK and SG BBM). In addition, there is a highly significant, positive linear correlation between the degree of identification and the frequency of match attendance ($r=0.514$; $p=0.000$). Furthermore, identification increases significantly with increasing age ($r=0.204$; $p=0.000$). Other factors that have a major influence on attendance demand in handball include an exciting, attractive or high-quality game and a derby. Looking at match scheduling (Non-sports related quality components), the majority (65.7%) prefer a match on Saturday from 3 p.m., followed by matches on Sundays and holidays from 3 p.m.

Based on the results, numerous strategies for efficient marketing measures for professional handball can be derived, i.e. the promotion of identification, stronger digitalization to attract younger attendance, additional offers for high-demand games (i.e. derbies) through public viewing and a stronger continuity in the game schedule.

Political Relations and Sports: Exploring the Demand for Relocated Soccer Games

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The authors refrain from including any content of the paper in the book of abstracts.

Session XVIII: Contest Organization I

Friday, 27 August, 17:00 CEST

Spatial concentration in intermediate products. Evidence from the soccer industry using a REWB model

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Introduction

How many leading companies can a country have in global markets? The new trade theory contributed to solving this issue based on the home-market effect (HME) (Krugman, 1980) and external economies of scale. According to the HME, production tends to concentrate in those regions with higher demand. In turn, the concentration of upstream and downstream firms in one area generates spillover effects that reduce average costs.

Recent literature has paid attention to intermediate products, which had not been covered in trade theory. Miroudot, Lanz and Ragoussis (2009) found a higher proportion of trade in intermediate goods and services over the total –56% and 73%, respectively. Their estimates show that, although trade in intermediate products is more sensitive to trade costs than final products, it can be still explained by the size of the bilateral market. Here, we take advantage of two characteristics of the soccer industry –the importance of market size (Buraimo, Forrest, & Simmons, 2007) and the nature of clubs as an inverted joint product (Neale, 1964) – to show how HME also allows explaining spatial concentration in intermediate products.

Methodology

Database

We work with strongly balanced panel data, where regions (level 2) are measured on several occasions t (level 1). The panel contains soccer performance and social-economic indicators for 20 Italian regions over 25 seasons –from 1995/96 to 2019/20. In 2004/05, the number of teams increased from 18 to 20, providing 500 region-year observations. We obtained this information from the websites <https://www.worldfootball.net> and <http://dati.istat.it>.

The model

The standard analysis uses a fixed-effects (FE) model when the Hausman test rejects the random-effects option. This approach has advantages and disadvantages. On the one hand, a FE specification is useful when estimating longitudinal effects since it allows removing unobserved differences between regions constant in time. On the other hand, the impact of regional differences (i.e., between effects) is omitted in the FE models, which leads us to ignore

crucial relationships that would allow us to understand the dependent variable's behavior. To solve this dilemma, we followed the suggestion by Bell, Fairbrother and Jones (2019). We estimated both longitudinal and cross-sectional effects using a random-effects within-between (REWB) model with random slopes:

$$y_{it} = \beta_0 + \beta_{1W}(x_{it} - \bar{x}_i) + \beta_{2B}\bar{x}_i + \beta_3 z_i + v_{i0} + v_{i1}(x_{ij} - \bar{x}_{ij}) + \epsilon_{it}$$

where y_{it} is the dependent variable, x_{it} represents time-varying covariates, and z_i denotes time-invariant independent variables. The coefficient β_{1W} estimates the impact of the explanatory variables changing over time (i.e., the within effect), while β_{2B} captures the cross-sectional effects (or between effects). Finally, v_{i0} represents a random effect attached to the intercept, and v_{i1} represents a random effect attached to the within slope.

The dependent variable is the share of teams that a region i has in season t playing in Serie A. Our model adopts the widely accepted paradigm of Bernard and Busse (2004) and uses regional population and regional gross value added per inhabitant at current prices as time-varying independent covariates. Unlike these authors, we consider that these variables play their role on the demand side, increasing club incomes. Some additional variables have been included in our model. First, we use non-contributory transfers per inhabitant expressed in net terms to analyze the redistributive policy's effect. Second, we add the number of provinces (which is a time-invariant independent variable) to explore the influence of political-administrative division. Third, we incorporate the number of cities over 100,000 inhabitants to control the concentration of population. Finally, we include a time-dummy variable that takes value 1 for those seasons that were played with 20 participants (2004/05-2019/20) and value 0 if they were played with 18 teams (1995/96-2003/04).

Results

Since the Hausman test rejects the random-effects model, we use the REWB specification. Estimates, shown in Table 1, provide evidence that the temporal evolution of the social-economic variables (i.e., the longitudinal study) does not significantly impact our dependent variable. Conclusions change when we focus on differences between regions or cross-sectional analysis: size market matters (a lot) to explain teams' spatial concentration. Model 1 shows that both the population and the gross value added per inhabitant are positively related to the percentage of teams from Italian regions in Serie A. In turn, Model 2 highlights the importance of redistributive policy. Model 3 shows that the political-administrative division of areas has a positive impact, presumably by creating a strong preference for the home brand through the feeling of belonging to a territory. This effect remains in Model 4 when we control for the number of cities with more than 100,000 inhabitants. Finally, in Model 5 we conducted

a robustness test where we remove unobserved temporal heterogeneity that is constant over areas by specifying regions as the first level of the model.

Table 1.

REWB models. Dependent variable: team share of region i in season t

	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Longitudinal: Within regions</i>					
Seasons 2004-2019	-0.2973 (1.2036)	-0.1233 (1.3267)	-0.1233 (1.3267)	-0.1865 (1.3355)	-0.0014*** (0.0003)
Population (,000,000s)	-0.1728 (2.0038)	-0.9465 (1.8460)	-0.9465 (1.8460)	-0.6540 (1.7721)	-0.0005 (0.0013)
GVA per inhabitant (,000s)	0.0722 (0.1100)	0.1272 (0.1496)	0.1272 (0.1496)	0.1134 (0.1262)	0.0000 (0.0001)
Net transfers per inhabitant (,000s)		-0.1184 (1.0749)	-0.1184 (1.0749)	-0.4513 (0.8175)	0.0001 (0.0002)
N. of cities over 100,000 inhabit.				0.8854 (1.5151)	0.0001 (0.0012)
<i>Cross-sectional: Between regions</i>					
Population (,000,000s)	1.5507*** (0.2079)	2.1472*** (0.2090)	1.3312*** (0.3462)	1.3403*** (0.3382)	1.0937*** (0.1395)
GVA per inhabitant (,000s)	0.2630** (0.1167)	0.5125*** (0.1088)	0.4607*** (0.0894)	0.4587*** (0.0944)	0.3942*** (0.0264)
Net transfers per inhabitant (,000s)		6.5542*** (1.4613)	4.9676*** (1.3487)	5.2654*** (1.5393)	3.6016*** (0.4914)
N. of provinces			0.6441*** (0.2475)	0.4396** (0.2193)	0.5487*** (0.1464)
N. of cities over 100,000 inhabit.				0.4561* (0.2364)	0.4092** (0.1756)
Constant	-5.1000** (2.0648)	-25.3935*** (5.2995)	-22.1739*** (4.7028)	-22.6051*** (5.2835)	2.0663*** (0.7831)
Observations	500	500	500	500	500
Number of regions	20	20	20	20	20
Number of years	25	25	25	25	25
Level 1	Years	Years	Years	Years	Regions
Level 2	Regions	Regions	Regions	Regions	Years
Wald chi2	210.4	186.5	267.8	340.9	5157.7
Prob > chi2	0.000	0.000	0.000	0.000	0.000
Log pseudolikelihood	-1262.5	-1255.0	-1251.8	-1246.3	-1310.9
AIC	2544.9	2536.0	2531.6	2526.6	2643.9
BIC	2587.0	2590.8	2590.6	2598.2	2690.3

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.

Monsters are not Real! Critique of Artificial Players Concept in the Bradley–Terry Framework

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Abstract

Bradley and Terry (1952) proposed the model that helps to introduce ranking (that is, a complete linear order) on the set of several players based on the outcomes of pairwise multiple win-or-lose matches. Under the assumption that all matches are independent and based on the history of pairwise duels, one can use maximum likelihood estimation in order to get estimates for players' ratings.

One limitation of the Bradley-Terry model in the sports competitions context is due to the fact that many sports games including football, ice hockey, handball, chess, etc., allow for draws. Several modifications of the standard model were proposed in the literature in order to account for draws (see, for example, Rao and Kupper, 1967; Davidson, 1970).

In a recent paper, Hankin (2020) proposed a modification of the Bradley-Terry approach and applied it to study collusion in chess competitions. The main novelty is that a draw outcome is modelled with an artificial player - a Draw Monster, - so that each chess match is regarded as a three-way competition between two players and a Draw Monster. The latter is characterized by its rating. A win of a Draw Monster in the three-sided contest means that the initial two-sided contest ends up in a draw. Hankin also proposed some further modifications, including modelling the first-mover advantage in chess with artificial Monsters and personal Draw Monsters for each player.

Our research contains several critical arguments against the concept of Draw Monsters and other Monsters in the Bradley-Terry framework. It appears that the concept of 'Draw monsters' and 'White mover advantage monsters' violates several types of monotonicity. I support my arguments both using axiomatic approach and with empirical observations based on the dataset consisting of all classic chess games from 2019 indexed in the chessgames.com database. After excluding observations with missing ELO ratings or Armageddon, blitz, or rapid variants of chess, as well as all other non-classic time control, the database boils down to 21463 match-level observations.

Pairwise winning probabilities defined in Hankin (2020) imply that the probability of a draw does not depend on the difference in the opponents' ratings given the sum of their ratings

is fixed. Figure 1 confirms that, from the empirical perspective, a pair of players with close ratings has higher probability of a draw than a pair of players with large difference in their ratings.

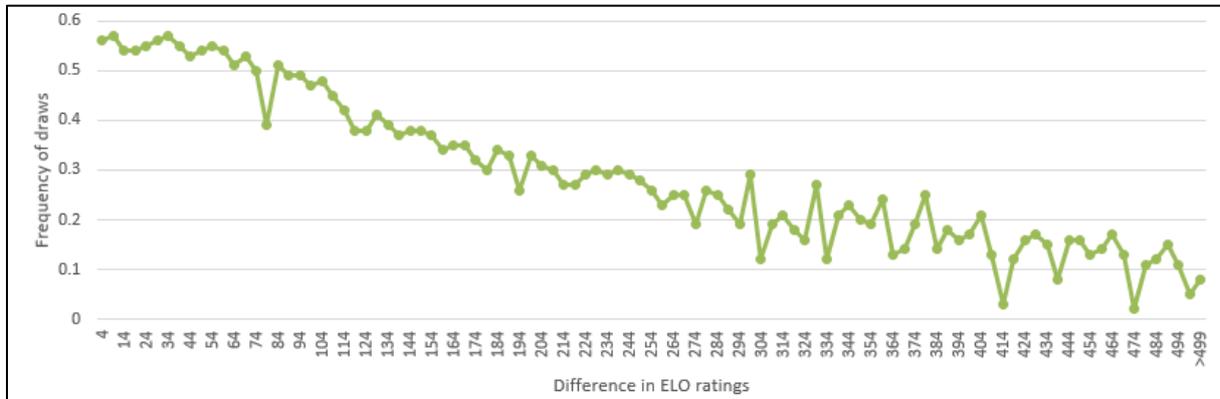


Figure 1.

The graph represents frequency of draws as a function of difference in the opponents' ELO ratings. A point x on X-axis corresponds to all games in the dataset such that the difference in the opponents' ELO ratings belongs to the interval $[x-4, x]$; the percentage of draws across all such games is represented on Y-axis.

Also, pairwise winning probabilities from Hankin (2020) imply that the probability of drawing a match decreases with the sum of the opponents' ratings. Figure 2 provides empirical evidence to support the opposite: a match between stronger players results in a draw with higher probability than a match between weaker players.

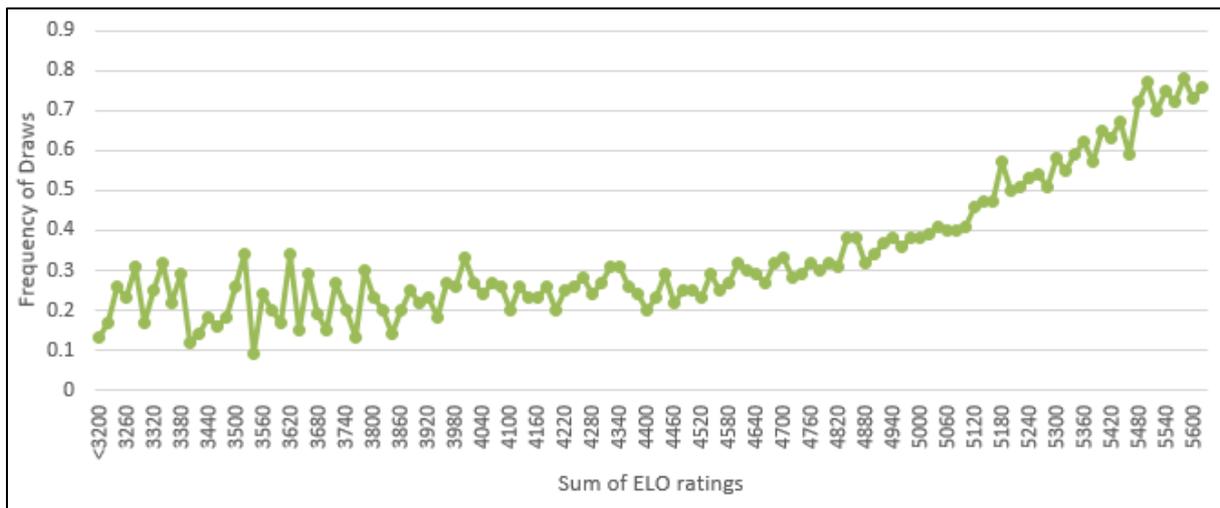


Figure 2

The graph represents frequency of draws as a function of sum of the opponents' ELO ratings. A point x on X-axis corresponds to all games in the dataset such that the sum of the opponents' ELO ratings belongs to the interval $[x-9,x]$; the percentage of draws across all such games is represented on Y-axis.

Next, we introduce the system of axioms for the set of pairwise winning probabilities in the Bradley-Terry model with draws. We check whether the probabilities from the previous literature satisfy those axioms. A complete characterization of the pairwise winning probabilities that satisfy this system of axioms is still an open question that requires further research.

Small fish in a big pond or big fish in a small pond? Tournament entry decisions in professional tennis

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Motivation

In various areas of life, agents compete (direct or indirectly) in a set of tournaments. For instance, one might think of competitions for promotion in an organization or R&D races. Yet, when tournaments are heterogeneous and participation is voluntary, the question arises of how agents decide which events to enter. Prior research has highlighted the importance of prize money differentials (Rosen, 1986) and momentum (e.g., Wozniak 2012; Jetter and Walker, 2015).

In this study, we add to the literature on what Morgan et al. (2018) call the ‘ponds dilemma’: is it better to be a big fish in a small pond or a small fish in a big pond? Put differently, as sorting implies that lucrativeness typically correlates with competitiveness, there is a trade-off between choosing a prestigious tournament with low winning probabilities or a less prestigious tournament with high winning probabilities. While there are several contributions from economic theory (see, e.g., Konrad, 2009; Mathews and Namoro, 2008; Morgan et al., 2018), evidence from the field is rather scarce. Conley and Onder (2014) find that the top segment of PhD graduates from less prestigious North American universities outperforms those from highly profiled universities in terms of research output for some segments of the distribution. Also, Zak et al. (2019) report that it is beneficial for Israeli chess players to participate in secondary tournaments rather than enter the main tournaments. These results suggest that, on balance, it pays off to be the big fish in a small pond.

In this paper, we use data from professional tennis where players can choose between different categories of tournaments (such as ATP Tour tournaments and ATP Challengers tournaments in male tennis). Tennis data allows us to focus on (i) possible gender differences, (ii) different career stages, (iii) a change in the trade-off between ranking points and prize money for the players around the threshold for direct acceptance to the main or qualification draw of Grand Slam throughout the year.

For the (iii), we use the fact that playing at Grand Slam is of great importance. It is a significant career milestone and an important signal to sponsors. We, therefore, expect to find

players within reach of the *Top 100* and *Top 230* positions to prefer ranking points over prize money, and hence to show a higher tendency to choose less competitive tournaments (the 'big fish' strategy). However, we observe that the ranking plays a different role throughout the season: at the Grand Slam entry application deadline, it is much more important to be above the direct acceptance threshold (either for main or qualification draw) than in the other weeks. Therefore, we may expect the players around the acceptance threshold to adjust the strategy just before these important weeks. This 'big fish' strategy can be seen as a career investment decision as it goes along with a reduction in expected income but could open the way to future opportunities. Overall, this exercise helps to gain insights into how agents adapt their tournament choice strategies to external incentives changes.

Summary of methods

Empirical analysis

In professional tennis, players are free to sign a tournament's entry list. However, the probability of acceptance depends on his or her relative ranking position in the field of candidates. Moreover, since there is more than one event in the same week, players must choose between a set of tournaments. In this paper, we aim to investigate not only which tournament factors drive the players' strategy but also if there are some players' characteristics that can explain the pursuing of different strategies.

In order to model players' tournament choice, we estimate a panel data mixed logit model. Tournaments vary with respect to the level of competitiveness (proxied by the prize money and point distribution), surface, location, and geographical area. The model assumes that given a set of alternatives (defined by formal ranking restrictions), players will choose the tournament associated with the highest utility. Based on players' choice, the mixed logit model estimates represent the marginal utility of the tournaments' attribute. In addition, to allow heterogeneity of preference among tennis players, tournaments' characteristics are interacted with players' characteristics.

Dataset and variables

Our preliminary sample includes information on 300 ATP players (the top 300 players at the beginning of the year 2019) and 225 tournaments. Tournaments' attributes are the surface, the competitiveness of the tournaments, and the geographical area. Player characteristics are age, ranking position, percentage of matches won, the number of tournaments played so far. Moreover, *important week* is an indicator variable for whether the time of decision is within the critical period when the ranking determines the qualifying and main draw participants of Grand Slam tournaments. In the same way, *threshold* indicates whether a player's ranking position is

close to the average last direct acceptance for the Grand Slam qualifying/main draw. Finally, to identify big fish / small fish strategies, we calculate expected points and prize money based on previous years' seeds.

Preliminary results

- We find that the likelihood of choosing a tournament with a low money/points ratio increases in the ranking position. That is, weaker players are more inclined to adopt a 'big fish' strategy. We explain this finding with investment behavior: players are willing to forgo expected income now in order to get access to the 'honey pots' later.
- Moreover, the interaction of *important week* and *threshold* indicates that *threshold* players ranked between 100-110 and 230-240 choose the 'big fish' strategy in the crucial phase of a season: They go for low-level tournaments in order to gain 'easy points' which may ensure acceptance for the Grand Slams draw.
- Contrary to our main finding, it shows that momentum and being of young age is associated with choosing a 'small fish' strategy. While the first result is in line with prior literature on momentum and feedback, the second result may be best explained with signaling and 'making a name' motives.

Outlook

In a next step, we will expand the sample. Besides additional ATP data from the years 2010 to 2018, we will include a sample from WTA tournaments to investigate potential gender difference.

Session XIX: Demand III

Friday, 27 August, 17:00 CEST

**General Admission Alcohol Availability at American College Football Bowl Subdivision
Stadiums: A Difference-in-Difference with Timing Variation Analysis of Ticket Sales
and Concession Revenues**

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Theoretical Background

Recently there has been an increase in the analysis of difference-in-difference when the treatment variable occurs at different periods, where for this case the periods are seasons. Econometrics researchers have shown in these cases that the estimated coefficient of the difference-in-difference variable under two-way fixed effects is a weighted average of the timing over the time period estimated and that the weights are always greater for those in the middle of the data (Goodman-Bacon – conditional acceptance *Journal of Econometrics*). This study exploits these recent studies by estimating the effect that introducing the sale of alcohol to legally aged general admission ticket holders at public (American Football) college stadiums. These alcohol policies have been increasingly open to more college football general admission spectators; but not for all colleges. Thus there are never “treated” colleges, always “treated” colleges and those that were “originally not treated” but over the course of the time period at some point become “treated”.

Methods Used

Drawing on the econometrics methods to adjust for difference-in-difference estimates when treatment is variable over time, I will use the Bacon Decomposition to model both ticket sales revenue and concession revenue models using these updated difference-in-difference econometric techniques.

Both ticket sales revenue and concession revenues are converted to real 2018 US dollars and then converted into natural logs. Each revenue model is estimated with the difference-in-difference variable, team level variables that could affect each revenue (aggregate home game attendance, current and lagged winning percent, geographic market variables such as population and real per capita income).

Major Findings

Preliminary results (a few universities have recently supplied more data, which needs to be analyzed) show:

- First, that allowing alcohol to be sold to legally-aged general admission college football spectators has a negative and statistically significant impact of the log of real ticket sales.
- Second, that allowing alcohol to be sold to legally-aged general admission college football spectators does not have a statistically significant impact on the natural log of real concession revenues.

Preliminary figures of each Bacon Decomposition treated / never treated/ not treated-treated weights are presented on the next page for both of the revenue models.

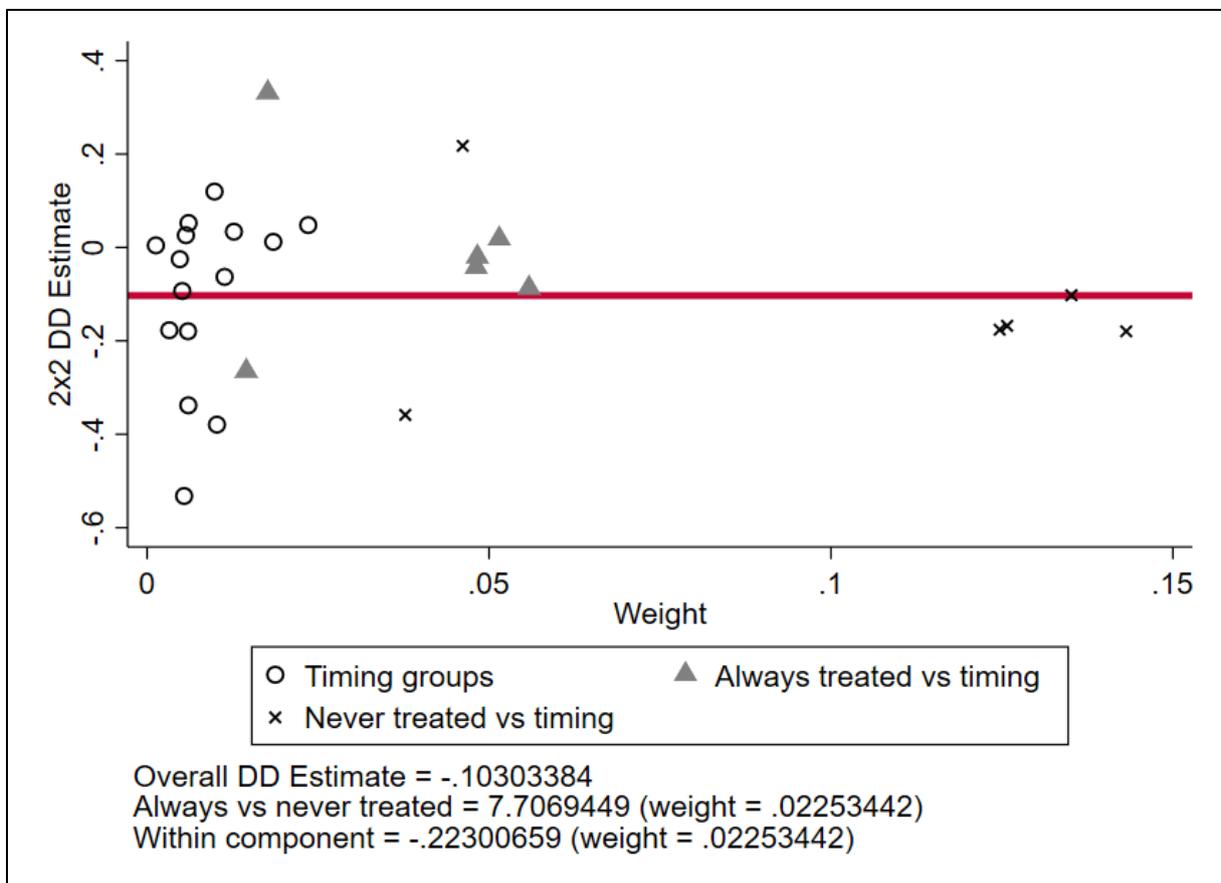


Figure 1.
Natural Log of Real Ticket Sales (2012 – 2018)

Behind Closed Doors: Impact of Zero Attendances on Home Advantage in Pro14 Rugby

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Summary

Home advantage is a widely observed phenomenon in many team sports. Several studies have highlighted the influence of crowds on referees' decisions as a significant source of home advantage. We use the natural experiment of matches played behind closed doors as a result of the COVID-19 pandemic to analyze the effect of crowds on officials' decisions using data from rugby's Pro14 league. Rugby Union displays a high degree of home advantage, partly because refereeing decisions have a significant influence on match outcomes. Over 18 seasons up to 2018/19 the Pro14 had an average home win ratio of 65% with only two seasons when it was below 60%.¹¹ In 2020/21, when virtually all matches were played without crowds present, the home win ratio dropped to 48%.

We consider three measures of referees' decisions - yellow cards, penalties conceded, and a composite measure.¹² A yellow card is more significant in rugby than in soccer because the player is excluded from the game leaving their team short a player for ten minutes.

Figure 1 illustrates the apparent effect of the absence of spectators. For each of our chosen measures, we subtract the value for the away team from that of the home team. We then graph the average of this statistic for 2018/19, the season before COVID 19 and 2020/21 – the first season fully affected by the pandemic.¹³ The difference in the bars reflects the effect of zero attendances. The results are shown in Figure 1. As is evident, referees were less (more) likely to sanction the home (away) team when crowds were present. In the absence of crowds, this bias against the away team declined for yellow cards and penalties, but not for the composite measure.

A more detailed analysis is provided in Table 1. Each column relates to one of our three variables. The dependent variable in each case is the value of the variable for the home team minus the value of the variable for the away team. The regressors control for team quality (win ratio, probability of qualification to the next stage) and dummies if the referee was from the same country as the home team and if the match was between two teams from the same country.

¹¹ Draws are unusual rugby with only 4% of matches over this period ending in a draw.

¹² The composite measure developed by Dawson et al., (2020) combines yellow cards, red cards and penalty tries. The referee can award a penalty try if they decide that foul play prevented a try (touchdown) from being scored.

¹³ The 2019/20 season was halted after 13 of the scheduled 21 rounds but only two further rounds were played when the league resumed. Thus, unlike other studies (), we cannot do a within season comparison of matches with and without crowds.

The main variable of interest is the level of attendance. The coefficient on attendance in all three regressions are negative and (borderline) statistically significant. This supports the hypothesis that referees are intimidated/biased by large home crowds. Note this effect is present controlling for referee origins, match characteristics and team quality.

The regressions assume that the variables impact the home and away team equally as the dependent variable in each case is the difference between home and away measure. To allow for the possibility that the control variables affect both teams differently we estimate a generalized bivariate model as in Dawson et al. (2020), in which the coefficient of the control variables can differ for the two teams. As most of the data does not have a normal distribution, we do not estimate a biprobit model but use a generalized model as implemented by Newton et al (2016), where we assume the data has a Gumbel distribution. Table 2 shows the results. Attendance is negative and significant for the home team in all cases but insignificant for the away team. This confirms the result of table 1 that the larger the attendance the less likely are referees to sanction a home team.

We ran further regressions (not included for space reasons) measuring the impact of attendances on team ball possession (as a measure of team effort) and on the success rate of penalty (direct free-kick) and conversion shots at goal (to test whether crowds might affect the away team goal-kicker which might also affect results) but both variables proved insignificant.

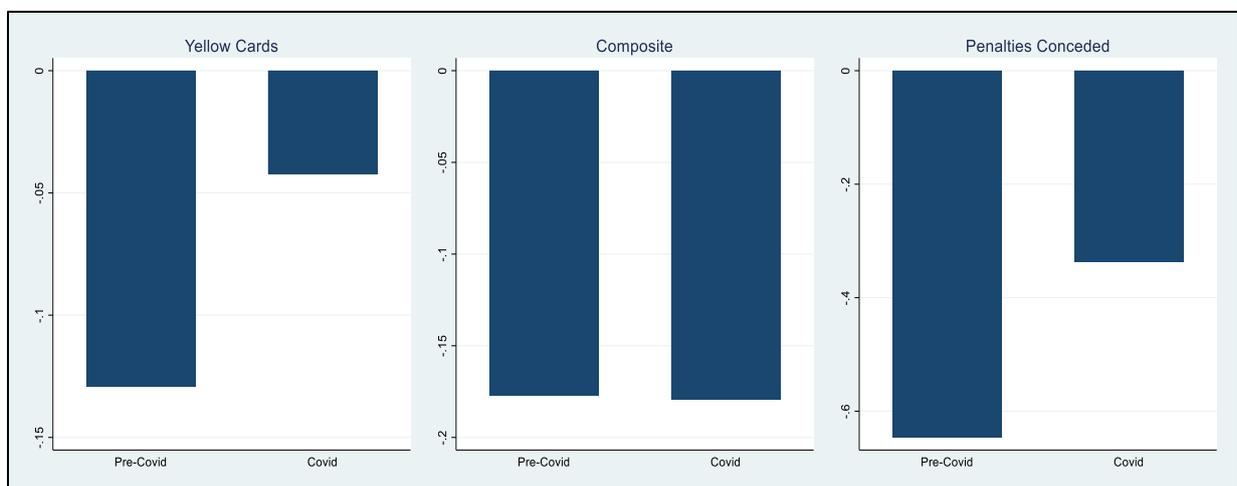


Figure 1.

The Impact of Zero Attendance on Referee Sanctions.

Table 1.*OLS Estimates of COVID Effect*

	Yellow Cards	Composite	Penalties
Attendance (000)	-0.0266** (0.010)	-0.0346* (0.014)	-0.0961* (0.048)
Round	0.0118 (0.013)	0.0265 (0.017)	0.0675 (0.060)
Derby	0.179 (0.275)	0.322 (0.377)	0.713 (1.292)
Home Win Ratio	-0.571 (0.291)	-0.684 (0.399)	-3.783** (1.367)
Away Win Ratio	0.629* (0.289)	0.587 (0.396)	5.494*** (1.357)
Home Pr. Qual.	0.0464 (0.086)	-0.0137 (0.118)	1.108** (0.403)
Away Pr. of Qual.	0.0175 (0.130)	0.150 (0.179)	-1.216* (0.613)
Home Ref	-0.366 (0.214)	-0.546 (0.293)	-2.597* (1.005)
Constant	-0.323 (0.344)	-0.635 (0.472)	-2.704 (1.618)
Observations	242	242	242

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.*Generalized Bi-Variate Model*

	Composite		Yellow		Penalties	
	Home	Away	Home	Away	Home	Away
Attendance (000)	-0.0391** (0.013)	0.00788 (0.011)	-0.0434** (0.014)	0.00361 (0.011)	-0.0427*** (0.010)	-0.0148 (0.010)
Home Win Ratio	-0.671 (0.348)	-0.441 (0.327)	-0.767* (0.359)	-0.520 (0.335)	-1.172*** (0.312)	0.886** (0.304)
Home Prob. of Qual.	0.0365 (0.099)	0.0107 (0.143)	0.0420 (0.103)	0.0974 (0.144)	0.146 (0.088)	0.128 (0.134)
Derby	0.341 (0.333)	0.0255 (0.318)	0.247 (0.339)	-0.00749 (0.323)	0.714* (0.283)	0.465 (0.284)
Home Referee	-0.159 (0.254)	0.460 (0.243)	-0.133 (0.261)	0.397 (0.248)	-0.0484 (0.219)	0.0140 (0.218)

**Exploring the Causal Effects of Marketing Events: An Application to Exhibition Games
in Football**

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The authors refrain from including any content of the paper in the book of abstracts.

Session XX: Contest Organization II

Thursday, 26 August, 17:00 CEST

Stop the thieves - how can a handful of top clubs plough up the entire football landscape almost unnoticed and without any significant resistance?

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Problem definition

The Corona pandemic has kept the world on tenterhooks for a good year. European professional football is also suffering serious economic repercussions. National and international competitions for the 2019/20 season were temporarily suspended before being brought to a conclusion with spectators excluded from the stadiums, under time pressure and with strict hygiene concepts. UEFA had to slim down the format of the Champions League in order to determine a winner at all in the summer of 2020. The annual financial statements of the European clubs published so far consistently show declining revenues, especially in ticketing and transfers, while at the same time player salaries continue to rise, resulting in significantly worsened annual results. Thus, the ticket revenues of the 18 Bundesliga clubs decreased by € 156 million and the transfer revenues by € 81 million compared to the previous season. Other revenues increased slightly, but total revenue decreased by € 218 million (5.4 %) to € 3.8 billion after 15 previous revenue records. The aggregate total loss of the 18 Bundesliga clubs was € 156 million, after a net profit of € 128 million in the previous year. The annual result thus deteriorated by € 284 million, with only eight clubs reporting an annual surplus, compared to 14 in the previous year (DFL, 2021). However, the truly drastic consequences of the Corona pandemic for the clubs' annual accounts are not expected until the current 2020/21 season. In December 2020, DFL's CEO Seifert announced "the storm that is now coming" (Ebert, 2020). The DFL expects the Bundesliga's revenue to drop by about 2 billion euros until 2022. And what the general conditions for football will be like from summer 2021 is hardly predictable: how many spectators will be allowed into the stadiums then? Will the enthusiasm and involvement of the fans still be as great as before the pandemic, or will there actually be drop-offs, which initial surveys suggest?

Terrifying news from Spain, too. In January 2021, it became known that FC Barcelona's liabilities amount to €1.173 billion and its net debt to €488 million, that of arch-rival Real Madrid to €901 million and €355 million respectively (Lowe, 2021). The economic stability of numerous clubs is in danger. In addition, there is long-lasting dominance of a few clubs in the national leagues, which has been lamented for years, with the result that the championship race

is losing its attractiveness (Pawlowski et al., 2018). The well-documented cause of this is the growing inequality in the distribution of, in particular, central marketing revenues from both the national and UEFA competitions within the national leagues.

In this time of already difficult economic conditions, UEFA is now taking decisions that will noticeably change its club competitions. Firstly, from 2024, the number of matches in the Champions League will be increased by 125 to 225, the number of participating clubs from 32 to 36. Secondly, in response to the Corona pandemic and allegedly identified shortcomings, the UEFA administration has announced that it will fundamentally modify the Financial Fair Play concept (FFP), in particular removing the cap on cash injections to cover losses, with the result that wealthy owners will be able to provide unlimited funds to their clubs in future.

Objective

Against the backdrop of the reform of the Champions League and the impending swan song of the FFP (Franck 2018, 2021; Sass 2016), first objective of this conceptual contribution is to disclose the expected effects of these decisions on the various stakeholders from an economic perspective and to identify possible need for further research. A second objective is to reveal the decision-making processes within the associations, leagues and among the clubs, which are not transparent to the public, especially the influence and lobbying of the representatives of a few top clubs such as Juventus, Manchester City, FC Barcelona and Paris St. Germain.

Relevance

UEFA's decisions come as a surprise to most league and club officials as well as to the sports media. The preoccupation with Corona, lack of personal exchange thanks to Corona and deliberate secrecy on the part of UEFA are reasons for this. Few fans were aware of the extent of UEFA's plans before the final decision on the new league format was taken, and no one outside the UEFA administration is yet aware of the FFP considerations. Corona prevents them from personal exchange in the context of match attendance, perhaps many fans have also temporarily reduced their involvement. Once informed fans, however, clearly reject the reforms. Of more than 170,000 participants in a fully up-to-date kicker survey, 90.9 per cent disapproved the reform, (Franzke, 2021). Given the increasing level of organization and networking among fans, loud protests could have been expected in full stadiums.

Major Findings

The inflation of the Champions League format and the abandonment of the backbone of the FFP concept are UEFA's pliant response to the threat for years by a few leading clubs of the European Club Association (ECA) to set up a Super League detached from the national

associations, whose financing is said to be secured by financial investors and which is supposed to guarantee monstrous revenues for the participating clubs. Participants would be the usual suspects, i.e. clubs that have reached consistently the knockout stages of the Champions League for years. In other words, the most valuable brands in the football world. The consequences of such a Super League for the national leagues, their clubs, their broadcasting TV stations and sponsors are obvious: they will have to accept a considerable loss of importance, the exodus of the best players, an outflow of public attention and thus also revenues upwards to the Super League if the new league manages to mobilize enough demand to be able to pay the highest player salaries.

The paper concludes that the blackmail potential of leading representatives of the ECA is, on closer inspection, on shaky ground. On the one hand, the announced sanctioning instrument of excluding players from clubs in a super league from national team competitions such as the World Cup is highly effective. Empirical studies suggest that top footballers are aware of the emotional significance of matches for their home country and thus also for their personal income and reputation. It is by no means certain that a Super League can attract the best players despite better salary offers.

Secondly, a Super League would lose the traditional fan base of football to a large extent. This is also due to its predictable "television league" character, in which the stadium experience no longer plays a comparable role as before. Whether the economic breath of the supposedly available investors will be sufficient to keep the loss-making league afloat long enough to tap new demand potentials is at least a high-risk bet.

Thirdly, due to the specifically German ownership structure and empirical studies already available, it is not to be expected that the member-run German elite clubs Bayern Munich and Borussia Dortmund could participate in a super league even if their boards wished to do so.

In this respect, it is frightening that the influence of very few leading ICE representatives on the UEFA governing bodies, especially the UEFA President, has been so effective that these bodies, responsible for the whole of European football, are putting its future in grave danger.

The impact of innovations on the competitive balance in the Kontinental Hockey League

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Introduction and Theoretical Background

The Continental Hockey League (KHL), formed in 2008, is an open international hockey league played by clubs from Russia, Belarus, Kazakhstan, China, Latvia, and Finland. It is divided into two conferences - East and West, each conference is distributed into four divisions. KHL was initially composed of 24 teams. Since the 2020/21 season, 23 teams from 21 cities of six countries have been playing in the league.

In recent years, the top management of the KHL has made several changes: a) the abolition of the “draft” in 2016; b) the transition to a new scoring system in 2018; c) the change in the number of teams when playing overtime, which was adopted since 2016. It is worth highlighting the innovative solution for European hockey to gradually switch to smaller playgrounds. The main motives for all these changes are the reduction of the economic gap between the teams, the increase in the competition, the attractiveness of matches among fans, and, finally, the economic efficiency of the league. The main goal of the work is to study innovations that may have an impact on improving the level of competitive balance in the KHL.

Methods

We will evaluate the level of competitive balance in the Kontinental Hockey League in three areas: inside - seasonal, off-season, and inside-game. In order to assess the change in the main indicators of the competitive balance of the league, taking into account the effectiveness of the decisions made by the top management of the KHL, in two different periods (before and after season 2015\16).

Data were collected from the official website of the Continental Hockey League (KHL) (www.khl.ru). Only the regular seasons of the Continental Hockey League were the object of the research. This fact is caused by the fact that the 2019/20 season play-off was not carried out due to the COVID - 19 pandemic, and the 2020/21 season play-off has not yet ended. The actual standard deviation (ASD), the ratio of the standard deviation of the percentage of winnings (RSD), the indices Herfindal Hirshman index (HHI) and Herfindal Hirshman index of competitive balance (HICB), and the Coefficient of competitive balance (CBR) were calculated for each team for 13 seasons (2008/09 - 2020/21). To calculate the marginality of victories, 9533 matches of the regular season of KHL were analyzed. The turning point for the

innovations were the season 2014/15 and 2015/16. All significant changes that could affect the estimates of the competitive balance of the league began to be accepted after this date. In particular, we sought to determine whether there was an increase in the competitive balance in the KHL after the start of innovations and after specific decisions were made. Data is a combination of all games played during the periods under review.

Main Results

A summary of the main results is presented in Table 1. Here there are some comments. Firstly, with the beginning of the distribution of funds from the sale of television rights, in the 2014/15 season, the level of competitive balance in the KHL rose to its historical maximum the next season. Secondly, after the introduction of changes in the number of hockey players participating in overtime from 4*4 to 3*3, at the end of the regular season 2016/17, the competitive balance worsened. Thirdly, by canceling the “draft juniors”, in 2017, at the end of the regular season, KHL received an even lower level of competitive balance. Despite the specifics of Russian hockey, such a competitive balance management tool as “draft” turned out to be significant for the Kontinental Hockey League. Further, according to the results of the regular season 2018/19, before which it was decided to switch to a new scoring system, the level of competitive balance fell to its critical minimum, without taking into account the first, experimental season of KHL. The solution, which was to result in a reduction in the point gap between the teams, increased competition, and interest of the audience, led to a negative result in the next regular season. We got another very interesting result. Before the start of the regular season 2019/20, most teams switched to smaller playgrounds, which was supposed to simultaneously lead to an increase in the entertainment of hockey matches and equalization of chances between strong and weak teams. At the end of the regular season 2019/20, we saw that our assumptions were justified and the level of competition in the KHL, after making this decision, increased markedly.

Table 1.*Competitive Balance Measure*

Competitive Balance Measure	2008 - 2015	2016 - 2021
ASD Winning Percentage	0.133	0.1336
Ratio: Standard Deviation in winning percentage/idealized standard deviation in winning percentage - RSD	1.978	2.071
HHI - Herfindahl-Hirschman Index	0.043	0.041
HICB - Herfindahl Index of Competitive Balance	107.4	107.13
CBR - Competitive Balance Ratio	0.593	0.503
Mean Margin of Victory	2.022	1.955
Number of different teams as winners of the KHL regular season	6	3
Ratio Teams winners (RTW): Number of different teams as winners of the KHL regular season/ Number of seasons	0.8571	0.5

Conclusions

This work contributes by combining the analysis of management decisions with the assessments that characterize the consequences of these decisions. We analyzed the main innovations used by the league to improve the competitive balance in the KHL. Also, we measured the competitive balance in KHL at three levels (inter-season, inside-seasonal and inside-gaming), which none of the researchers had previously done. The results we obtained indicate that the decisions made by the league over the past six seasons did not have a positive effect. However, from a comparative analysis of the adopted innovations and the time of their adoption, we received information about which of these innovations had a positive effect on the level of competitive balance, and which, on the contrary, lowered its level.

Despite the fact that the literature in the field of competitive balance in sports leagues and hockey, in particular, is extensive, in our work we found another factor that can affect the competitive balance. For the first time, we drew attention to another means of regulating the competitive balance in hockey - the size of the playground. After conducting the analysis, we found that with a large number of teams reducing the size of their playgrounds, the level of competitive balance in KHL has grown markedly. Our assumption that a decrease in the site led to an equalization of the chances of victory between a strong and weak opponent was confirmed.

An unrealistic competitive schedule? Football club locations, travel, and lack of rest in Brazil

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Introduction and research context

Football has been fueled by its entertaining appeal, driving ever-increasing demands for fixtures in national and foreign domains. However, adding more games and squeezing a competitive schedule for commercial purposes do not necessarily translate into a better performance output, as sports teams still rely on proper training and recovery time as paramount needs to deliver their full potential. Decision makers shall care about athletes and coaches first in order to leverage both the technical and economic outcomes in their sports services. Thus, to further assess the effects of a congested match schedule on training opportunities, as well as the relationship between club location and accumulated travel during a league season, we investigate football in Brazil.

In a country shaped by an extensive territorial area of roughly 8.5 million squared kilometers (e.g., Europe is covered by 10.2 million squared kilometers altogether), clubs tend to witness continental travel distances framed inside a single domestic territory, which forces them to compromise training sessions and recovery time whenever the competitive schedule prioritizes continuous games on a weekly or monthly basis throughout the season. From 2010 to 2019, the first tier of the Brazilian football league, the *Brasileirão*, squeezed its match schedule on a tight window of 211 days, on average, each year. In comparison to European leagues during the same period, for example, the German Bundesliga was held within an average of 272 days. Although played by 18 clubs instead of 20, Germany has a winter break to balance off this comparison. Similarly, the Spanish LaLiga was organized over 272 days on average, while the English Premier League was carried out through 277 days on average.

Such an initial outlook already highlights a higher availability of training and recovery time for German, English, and Spanish clubs, boosting the potential of their athletes, coaches, and staff members at work. Furthermore, their domestic commuting covers shorter distances with a wider range of transportation means to facilitate movements (e.g., direct flights among regional airports; train connections in railroad systems), which differs from the reality faced by Brazilian football clubs. Besides, all 27 federal units in Brazil run their own state leagues from January to April (prior to the *Brasileirão*). Within this scenario, preseason training is also

compromised, as clubs have a maximum length of two to three weeks to prepare before their local competitive schedule officially starts in mid-January. In summary, Brazilian clubs travel and play a lot more, while training and resting much less at the elite level.

Therefore, our study aims to assess potential disparities and inefficiencies set out by the competitive schedule in Brazil, where continental distances showcase a unique reality. We intend to answer two research questions: (1) Are there differences between club location and accumulated travel within the league? And (2) how did the extent of recovery time affect training opportunities in Brazil?

Literature review

The effects of travel on performance have been researched to identify relationships with injury rates (Dupont et al., 2010), sleep deprivation (Youngstedt & O'Connor, 1999), as well as player fatigue (Watanabe et al., 2017). Parallel to performance effects, scholars have also examined sports scheduling to draw alternative formulas (Rasmussen & Trick, 2006), and to assess player reactions to congested matches (Julian et al., 2020). Overall, scientists have analyzed scheduling mostly in reference to programming, mathematical models, and physiological outputs (Kendall et al., 2010; Leatherwood & Dragoo, 2014).

From a sport managerial approach, however, there is still a knowledge gap to better understand how training and preparation may suffer directly from travel and fixture demands in football. By absorbing what the sports scheduling literature has to offer regarding the constraints in physical performance and injury risks (Carling et al., 2015; Lago-Penas et al., 2011), the importance of rest and recovery (Eccles & Kazmier, 2019; Fullagar et al., 2016; Orlando et al., 2010), and the effects of congested match schedules (Rey et al., 2010; Vieira et al., 2018), sport researchers may benefit from learning and merging football management with athletic performance to better evaluate actual practices.

Methodology and preliminary findings

Our empirical setting for this study is the Brazilian football league, which is examined across 10 seasons (2010-2019). A secondary and longitudinal dataset was compiled with 3,800 individual games (n=7,600 match-level observations), followed by empirical tests including a two-way ANOVA and a multiple linear regression. We first assessed differences among club locations and accumulated travel, and later identified how training opportunities are affected during the season. Our main variables of interest are: Training sessions, which was calculated based on the availability of free days between matches and training/tactical periodization estimates (Delgado-Bordonau & Mendez-Villanueva, 2012), accumulated within-season travel, which reflected the total distance covered by teams in each game (roundtrip in kilometers), and

club location, which referred to four different regions (Northeast, Midwest, Southeast, and South). We also controlled for parallel cups, home advantage, weekend and derby matches in our regression.

In terms of the main descriptive statistics, 35 different clubs participated across all 10 seasons under analysis, which combine for 17 cities from 12 federal units. Nonetheless, these clubs did not necessarily play in their hometowns whenever they held home field advantage, as our sample has identified that games were hosted in an impressive amount of 75 different stadiums located in 48 host cities from 20 federal units. That is, even teams with home advantage travelled occasionally more than what conventional wisdom would suggest, which happened due to a range of factors (e.g., commercial agreements, political decisions, construction or renovation phases).

Our preliminary ANOVA findings indicate a statistically significant difference in accumulated within-season travel and in final rankings (finishing in the Top5, Mid-Table, or Bottom5) among the four different regions. A post-hoc test revealed significant pairwise differences among regions. Clubs located in the Northeast impressively travelled a lot more compared to clubs located in the Midwest ($M=22,960.09$ km), Southeast ($M=34,201.45$ km), and South ($M=26,110.24$ km). Likewise, clubs from the Midwest also travelled significantly more than those located in the Southeast. And even clubs from the South accumulated more travel in comparison to Southeastern clubs. Interestingly, Southeast clubs that covered longer distances appeared in the last final rankings (Bottom5), while Northeastern and Midwestern clubs with higher travel demands were also concentrated either in the Bottom5 or Mid-Table.

Upon running our multiple linear regression, the predictors in the model explained about 16% of the variance in training sessions. The difference in rest days between teams was the strongest predictor of training opportunities, directly followed by days preceding a derby match. Additionally, if matches were played on the weekend there was also a significant effect influencing training sessions.

From our preliminary results, we can infer that there is a heavily unbalanced travel scenario outside the Southeast, as clubs cover exponentially longer distances during the season. Besides, Brazilian football teams may clearly advocate for more training opportunities in face of the number of rest days available between games, especially favoring matches with spreads around weekend fixtures instead of congesting the competitive schedule on weekdays.

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