Beyond the pitch: Exploring the role of beauty in soccer player salaries

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ABSTRACT

The paper explores the potential influence of subjective factors on salary determination, particularly examining the impact of physical appearance on the earnings of soccer players. This study encompasses data from 373 Major League Soccer players over 12 seasons (2007-2018). Facial symmetry, quantified using the coordinates of each player's facial features, is utilized as an indicator of physical attractiveness. Various analytical models, including linear, semiparametric, and quantile models, are applied. The results point to a notable 'beauty premium' in the salary structure within this context, with the effects being more significant among the highest earners.

1. Introduction

Behavioural biases influencing labour market have been profoundly studied for the recent ten years in the academic literature (Asad et al., 2023; Axelrad et al., 2016; Bjerk, 2009; Kooij et al., 2011; Liu & Sierminska, 2015). This specific interest is conditioned by numerous subjective factors bringing inequality and productivity distortions when it comes to employee-employer relations. Said that, we propose to look at empirically proved consequences of one of the most important factors in labour contracts - salary determination. We assume that any subjective distortion and discriminatory practice in employees' compensation may expose labour market to a considerable risk. Both over- and undervalued employees may demonstrate lack of productivity as a result. Intuitively this may be aggravated when the digitally driven information transparency is increasing and suppressing related asymmetry. In other words, the more information for estimating a true value of employees - the more propensity to discover biases in case of unfair salary determination. This scenario bears higher risk of deliberate negative reaction from the employee side.

Hence, we expect that the transparency of the labour market will be substantially increasing due to its digital transformation, discriminatory practices and other distortions of salary determination must be revisited and profoundly studied. Among other research problems in the field of salary determination, physical attractiveness as a factor of discrimination has been numerously studied.

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However, controversial pieces of empirical evidence make it complicated to explain and predict whether this subjectivity takes place for over- or under-evaluation of employees. The interpretation for both biases is delivered in the literature. However, none of those interpretations have a solid theoretical ground and robust empirical confirmations. Partially this problem refers to settings, metrics and econometric strategies as chosen for different studies. The most successful still rare empirical attempts have been undertaken by sports economists who provided relatively persistent evidence for positive discrimination for more physically attractive athletes (Dietl et al., 2020; Brook, 2021). Moreover, these findings are relevant for different competitive individual and team sports (Berri et al., 2023; Berri et al., 2015)., professional sports are highly competitive settings where one would expect that salaries are essentially driven by performance rather than physical characteristics of the players. Meanwhile, the literature regarding salaries determination is commonly using restricted manually collected data and states this fact as one of the main limitations.

This paper comes to shed some light on this matter and examine whether salary determination is virtually exposed to individual perceptions and whether different contexts may influence this relationship (Cloutier & Vilhuber, 2008; Rees, 1993; Thacker, 1995; Sierminska, 2023). We suggest carrying out the analysis on vast data about soccer players and test whether wage determination practices are influenced by the physical characteristics of athletes and whether this effect differs across levels of compensations. Accordingly, the following research question is developed: 'Do professional soccer players enjoy a so-called beauty premium in their salaries?' and 'Is this premium similar for low- and high-paid soccer players?'. In answering these research questions, we seek to elaborate more on theoretical interpretation expecting to contribute to the theory of salary determination. The empirical analysis is carried out on data of more than 370 players covering period of 12 years from 2007. The econometric strategy employs quantile regression mechanism aimed at discovering heterogeneous effects for different levels of soccer contracts.

This study contributes primarily to the literature on wage determination and the beauty premium. It addresses a gap in the empirical understanding of how physical attractiveness influences salary decisions.

Thus, this study seeks to align with and extends the classical economic theories that suggest wages are determined by market forces of supply and demand, as well as worker productivity (Kao, 2019; Rees, 1993). By incorporating factors such as physical attractiveness, our research adds a new dimension to these traditional theories. It examines how subjective elements, alongside the conventional determinants like skill levels and qualifications, can impact salary outcomes. This is particularly pertinent in highly competitive industries, with professional sports serving as an ideal exemplar. Such an approach brings a novel viewpoint to salary determination, merging objective market dynamics with the nuances of subjective human perceptions.

Regarding the beauty premium, our study bring to the discussion into a phenomenon extensively explored by economists and social scientists (Hamermesh & Biddle, 1994; Harper, 2000). While previous research has established a connection between physical attractiveness and earnings, our study specifically investigates this relationship within the sports context. It expands upon existing literature by examining how beauty premiums manifest in a field where performance is highly quantifiable and ostensibly the primary determinant of salary. By focusing on professional soccer players, the study provides new insights into how beauty premiums operate in environments traditionally thought to prioritize skill and performance over physical appearance.

Furthermore, our research contributes to the debate on whether the beauty premium is consistent across different levels of compensation. This aspect has been less explored in the literature, especially in the context of sports economics. Our empirical analysis uncovers and interprets the heterogeneous effects at different salary levels. This methodological approach not only enriches the empirical analysis in this field but also provides a understanding of how physical attractiveness impacts athletes' earnings across the spectrum of high and low earners.

This paper organized as following: the next section gives an overview of the relevant literature providing readers with the state of the art in the fields of wage determination and empirical evidence for a positive beauty premium delivered by sports economics literature. The following paragraphs describe methodology, metrics, and unique approach for data collection. The paper is completed by empirical findings and their discussion delivering possible interpretation for further theoretical elaboration and advancements.

2. Theoretical Background and Literature Review

2.1. Wage determination

While classical economic theory focuses on supply and demand, skill levels, and market conditions as primary determinants of wages (Kao, 2019), modern research shows that wage determination is also significantly conditioned by factors su ch as perceived race (Courey, 2020; Cornwell et al., 2017; Ma & Haugen, 2022; Storer et al., 2020), gender (Blau & Kahn, 2017; Caliendo et al., 2017; Farrugia et al., 2024), age (Axelrad et al., 2016; Carlsson & Eriksson, 2019; Kooij et al., 2011; Nakai et al., 2011), and physical attractiveness (Bjerk, 2009; Doorley & Sierminska, 2015; Kukkonen et al., 2023; Sierminska, 2023).

Thus, modern perspectives have expanded upon the classical factors of wage discrimination. For example, the concept of negotiated wages (Pulignano & Morgan, 2023; Williamson & Roles, 2023) considers the equilibrium between unemployment and vacancy rates, taking into account the current and future value of wages and social marginal product.

Recent studies have a special focus on the impact of various forms of discrimination on wage determination. For instance, Cornwell et al. (2017) observed that perceived race can influence wages, with changes in reported race affecting earnings. Gender inequalities are another crucial factor. Sandberg (2017) pointed out how pay systems, despite claiming gender neutrality, often reflect gendered cultural valuations of jobs and occupations, leading to wage disparities based on gender.

As has been mentioned earlier, age discrimination is another significant factor, as evidenced in the recent studies by Carlsson and Eriksson (2019), who noted a decrease in call-back rates for job applications from older workers, with the effect more pronounced for women. This discrimination is often rooted in stereotypes about older workers' flexibility and willingness to learn new skills. Other

factors influencing wages include the age of the firm, with Okajima et al. (2021) finding that older firms tend to pay lower wages but have a steeper wage-tenure profile slope, particularly in non-productive industries.

This study primarily centers on exploring the 'beauty premium' phenomenon, a topic that has been extensively investigated in various studies, yielding diverse and sometimes contradictory findings. These mixed results are discussed in the next subsections in more details.

Our study specifically examines salaries instead of wages, based on our setting's characteristics. We suggest that the core theories and factors affecting wage determination are also relevant in determining soccer players' salaries. This approach helps us gain a deeper insight into compensation in the sports industry.

2.2. The existence of beauty premium

Financial and social biases regarding physically attractive people have been a phenomenon of considerable interest to economists, social psychologists, and evolutionary psychologists (Maestripieri et al., 2017). According to various economic studies, physical beauty affects people's earnings (Averett & Korenman, 1996; Hamermesh & Biddle, 1994; Harper, 2000; Rhodes et al., 1998; Sierminska, 2023). Hamermesh and Biddle (1994) earlier evaluated the impact of looks on respondents' hourly earnings by a survey where interviewers "rate their physical appearance" on the five-point scale. The results showed that plain people earn less than average-looking people, who earn less than the good-looking ones. Moreover, the plainness penalty is 5-10 percent, which is slightly larger than the beauty premium. Control variables are included in the analysis (i.e., marital status, education, self-reported health status). Later, Averett and Korenman (1996) find out there is some evidence of labour market discrimination against obese women. Harper (2000) comes to similar conclusions while examining the effect of physical appearance on hourly earnings, employment patterns, and family income in Great Britain using longitudinal data with 17,733 individuals in the target sample. The results show that those people assessed as unattractive children fare less well in the labour market in adulthood while children assessed as attractive obtain significant economic advantage.

2.3. Why beauty pays

According to previous research the positive impact of attractiveness is explained through economics, social and evolutionary theories. A model developed by economists - the "taste-based" discrimination model - assumes that biases are the result of individual preferences or prejudices, without explaining why these preferences or prejudices occur (Maestripieri et al., 2017). Other explanations proposed by economists and social psychologists assume that beauty and attractiveness is connected with latent characteristics such as goodness (Cui et al., 2019), productivity (Hamermesh & Parker, 2005; Hamermesh and Biddle, 1994; Pfann et al., 2000), self-confidence (Deryugina & Shurchkov, 2015; Doorley & Sierminska, 2012), and negotiation skills (Mobius & Rosenblat, 2006). Evolutionary psychologists argue that attractive people are favoured because they are preferred as sexual partners (Gangestad & Scheyd, 2005; Maestripieri et al., 2017).

Beauty matters in different countries and kinds of jobs

Research shows evidence of the beauty premium based on data delivered from different countries (Biddle & Hamermesh, 1998; Hamermesh & Parker, 2005; Hamermesh, 2006; Parrett, 2015; Pfann et al., 2000). Biddle and Hamermesh (1998) report that better-looking attorneys who graduated from a Law school in the 1970s earned more after 5 years of practice than their worse-looking classmates. Pfann et al. (2000) show that Dutch advertising firms with better-looking executives have higher revenues and faster growth than do otherwise identical firms whose executives are not so good-looking. Hamermesh and Parker (2005) indicate that professors from the University of Texas at Austin who are viewed by their students as better looking receive higher instructional ratings. They reveal that this impact exists within university departments and even within particular courses and is larger for male than for female instructors. Hamermesh (2006) studied the outcome of election as an officer of the American Economic Association and demonstrated that a particular outcome becomes more favourable for the same person when perceptions of his/her looks improve. Likewise, Parrett (2015) evidences that attractive servers in Richmond, Virginia earn more per year in tips than unattractive ones. Recently, Póvoa et al. (2020) show evidence of a large beauty premium caused by makeup wearing. Their finding found that women wearing makeup were perceived as more attractive, leading to increased trust from participants in a trust game experiment, resulting in larger money transfers to female trustees, particularly when trustors were men, demonstrating a makeup-mediated gender-specific trust effect.

2.4. Role of beauty in sports

There is relatively little economics research into the effect of physical attractiveness on earnings in sports (Dietl et al., 2020). For instance, Berri et al. (2011) shows that National Football League quarterbacks who are more attractive are paid greater salaries and this premium persists after controlling for player performance. From another perspective, facial attractiveness plays a positive role for live tennis female matches, being responsible for boosting broadcast audiences (Dietl et al., 2020).

Nevertheless, in some cases attractiveness might have the opposite effect. To the best of our knowledge, the only papers confirming the existence of beauty penalty are Andreoni and Petrie (2008) and Guo et al. (2023), which, however, differ on the cause of punishment for beauty. Andreoni and Petrie (2008) conducted their experiments using a linear public goods game. Players expect beautiful people to be more cooperative, even though beautiful people contribute, on average, more or less than others. Therefore, the beauty premium disappears when researchers provide information on individual contributions, and becomes a beauty penalty, as far as

beautiful people appear more selfish, which in turn results in less cooperation by others.

Guo et al. (2023) analyse the NCAA FBS football head coaches' appearance and their impact of earnings from 2014 to 2016. The results show clear evidence of a salary premium for less attractive employees. Authors also find evidence of an aggressiveness premium, as well as evidence of higher attendance at games coached by less attractive and more aggressive appearing coaches, supporting customer-based preferences for the premia.

2.5. Methods of measuring beauty

The above-mentioned papers rely on several methods to measure physical attractiveness and provide the proxy of beauty. Most of them define respondents' beauty via surveys with an interviewer, who visits the respondent live and rates his/her physical appearance (Hamermesh and Biddle, 1994) or questionnaire for rating candidates' photographs on a particular scale, for example, from 1 "plain" to 5 "above-average beautiful" (Biddle & Hamermesh, 1998; Deryugina & Shurchkov, 2015; Hamermesh & Parker, 2005; Mobius & Rosenblat, 2006; Nestor et al., 2010; Parrett, 2015; Pfann et al., 2000; Scholz & Sicinski, 2015). Afterward researchers began to lean towards more complex techniques for determining people's beauty as far as survey or questionnaire methods might have inherent biases (Dietl et al., 2020). For example, Guo et al. (2023) estimate the attractiveness of each employee using a neural network approach, a pretrained Convolutional Neural Network fine-tuned for this application in order to eliminate biases induced by volunteer evaluators and limited numbers of photos.

Another approach to define beauty is measuring facial symmetry whose relevance has been proven. Rhodes et al. (1998) conducted a series of experiments manipulating the symmetry of faces and showed that attractiveness increased when the symmetry is increased, and decreased when symmetry is reduced, in individual faces, and natural variations in symmetry correlated significantly with attractiveness. Later Perrett et al. (1999) through varying the shape of facial features (with skin textures held constant) show that increasing symmetry of face shape increases ratings of attractiveness for both male and female faces. These findings imply facial symmetry may have a positive impact on mate selection in humans and rating a person as attractive and beautiful. Therefore, future research has justifiably used this approach to determine attractiveness and beauty. Dietl et al. (2020) in order to test the relationship between attractiveness and Tennis TV-Viewership, measured by tennis players' facial symmetry. To derive attractiveness scores, authors used software called "Prettyscale" that calculates facial symmetry scores based on 14 different landmarks that have to be manually placed on the photos of the players. Another software is used in Berri et al. (2011), who measure NFL quarterbacks' attractiveness by facial symmetry using a symmetry measurement tool "Symmeter".

Considering all aforementioned details, this paper aims to contribute to the literature reinspecting the impact of beauty in earnings of professional sport players employing an objective metric of beauty via symmetry of their faces. This research attempts to clarify the previous ambiguous evidence in professional sports regarding whether beauty constitutes a premium or a penalty in their salaries. The setting allows for a proper identification of the intended effect due to its key characteristics, such as professional workers, clear performance indicators and available salary data. Therefore, the findings of this paper might be appropriate for identifying a particular discrimination practice in that labour market as well as, if it is found, it may assist sport managers in their decision-making process concerning salary, beauty, and performance issues.

3. Research Design, Methodology and Data Analysis

We use data of Major League Soccer (MLS) in this research. MLS is a growing league and an excellent platform to test labour economics theories since microdata on both salary and performance is available.

The Major League Soccer (MLS) is the highest level' professional soccer championship in the United States and Canada. Founded in 1993 and launched in 1996, the MLS has a single-entity structure, where clubs are shareholders of the league and players are centrally owned by the league. Likewise, other North-American Major Leagues, the MLS is a closed league - with no promotion and relegation system - where new entrants have to be approved by all members and the league after accomplishing some requirements for entering. Moreover, the MLS implements some policies not commonly found on European soccer, such as salary cap, designated player rule and drafts. Despite these differences, clubs are individually operated by franchises' owners and, hence, sportive decisions are taken independently.

MLS is experiencing a fast-growing development since its creation. The number of franchises has enlarged from ten teams in the inaugural season to the current 26 participants - and an expansion to 30 franchises is also planned to happen in 2023. Also, the league average attendance increased by 34% from 2003 to 2018, being in 2018 the eighth league in the world in number of attendees per match, ahead of traditional leagues as Belgium, Brazilian, Portuguese, and Scottish.

The MLS offers an optimal setting for testing labour market theories. It is a highly competitive environment composed of well-paid professional workers and profit-maximize firms. Moreover, the league provides historical statistics of players, including personal characteristics (e.g., personal picture, age, birthplace), performance metrics (e.g., minutes played, goals, assists, yellow and red cars) and salaries (e.g., base and total compensation). Thus, an appropriate analysis can be conducted inspecting the impact of beauty on salaries using MLS data. We have collected data for players' salaries, their performance, and their profile photos on the mlssoccer.com website. We use Microsoft Face API to get the coordinates of the face elements and then evaluate the facial symmetry, which is the proxy of beauty.

The dependent variable in our econometric model is the salary of the players. Once the distribution of salaries is skewed, we use logs in the regression analysis. The set of explanatory variables includes face symmetry, goals, assists, age and age2 and a dummy for designated players. A dummy variable for the continent where the player was born is used for controlling any effect from race that

might impact the results. Clubs' and season' fixed effects are also included. To have a reliable performance indicator, we concentrate only on forwards. We use goals and assists per 90 minutes as a performance indicator. Our sample includes 373 observations for the period 2007-2018.

4. Data description

4.1. Descriptive statistics

Table 1 reports the summary statistics of our sample. To have a reliable performance indicator we concentrate only on forwards. The sample includes 373 observations for the period from 2007 to 2018. We use goals and assists per 90 minutes as performance indicators. As one can see, the distribution of both base and total compensation, measured in dollars, is skewed, so we later use logs in the regression analysis. Also, there is a set of explanatory variables considered such as players' age and a dummy for designated players. An average player in our sample is approximately 29-year-old. The variable of our interest called "beauty" values almost from 0 up to 1 and is measured as we explain later.

The mean base salary is over \$446K, with a considerable standard deviation of \$1,068K. This large standard deviation suggests that there is a wide range of salaries among the athletes, indicating potential disparities in their pay scales. The mean total compensation is higher at \$512K, which includes base salary and additional components like bonuses. However, the standard deviation for total compensation is also significant at almost \$1,204K, indicating that the variability in compensation extends beyond just the base salary. The average bonus paid to athletes is over \$65K, with a standard deviation of \$203K. Notably, the minimum value for bonuses is zero, suggesting that some athletes do not receive any bonuses, while others receive substantial bonuses, as evident from the maximum value of \$1,515K.

The table includes performance metrics such as "Assists/90min" and "Goals/90min." On average, athletes provide 0.14 assists and score 0.33 goals per 90 minutes of play. The higher standard deviations for these metrics (0.17 and 0.40, respectively) indicate that there is a significant variation in performance among the athletes. The table includes a variable "Beauty" with an average rating of 0.29. The specific interpretation of this variable appears to be an objective measure related to the athletes' facial symmetry widely used in academic research as a plausible approximation of athletes' attractiveness. With a standard deviation of 0.24, there is notable variability in these beauty ratings among the athletes.

The average age of the athletes is 29 years, with a relatively low standard deviation of 3.3 years. This suggests that the age distribution might be more concentrated around the mean, indicating a relatively homogeneous age group among the athletes. The "Star players (designated)" variable indicates that, on average, 25% of the athletes are considered star players being outside the general regulation of salary cap. The large standard deviation of 0.43 shows that the classification of star players is not consistent across the dataset, with some teams or organizations designating more players as stars than others.

4.2. Suggested metric of attractiveness

In academic research, facial symmetry is a commonly used metric to approximate athletes' attractiveness due to its measurable and objective nature. For instance, Berri et al. (2011) conducted a study on National Football League quarterbacks, demonstrating that quarterbacks perceived as more attractive were paid higher salaries, with this beauty premium persisting even after controlling for player performance. This research exemplifies the quantifiable impact of physical attractiveness on earnings in sports. Similarly, Dietl et al. (2020) explored the influence of facial attractiveness on tennis TV viewership, highlighting how female tennis players' facial symmetry positively correlated with broadcast audience size. These examples underscore the relevance of facial symmetry as a robust, objective measure of beauty in the context of sports economics, providing a solid foundation for our study's approach.

We use Microsoft Face API to get the coordinates of the face elements and then evaluate the facial symmetry, which is the proxy of beauty. Below we provide more details on this indicator.

The program determines location of a human face in the image and returns various types of data on faces. One of the return data types is face landmark points - a set of easily detectable points on the face, such as pupils or nose tip. By default, there are 27 predefined

Table 1
Descriptive statistics

Statistic	N	Mean	St. Dev.	Min	Max
Base Salary	373	446,485.50	1,068,026.00	12,900	5,610,000
Total Compensation	373	512,129.70	1,203,790.00	12,900	7,115,556
Bonus paid	373	65,644.17	203,123.50	0	1,515,556
Beauty	373	0.29	0.24	0.004	0.94
Assists/90min	373	0.14	0.17	0.00	1.34
Goals/90min	373	0.33	0.40	0.00	4.74
Athlete's age	373	28.76	3.30	19	43
Star players (designated)	373	0.25	0.43	0	1

Note: This table presents an overview of Major League Soccer player salaries and associated attributes for the study period. All salary figures are presented in U.S. Dollars (USD) for the year 2018. The table includes key variables such as player positions, age, years of experience, and team performance metrics, alongside calculated facial symmetry scores to correlate with player salaries.

landmark points. We use 22 points to determine our metric.

Figure 1 contains the marks of facial attributes. Ten anthropometric points on each side of a face were used to measure the proxy of beauty: outer corner of an eyebrow (A), inner corner of an eyebrow (B), nose root point (C), eye top point (D), outer corner of an eye (E), eye bottom point (F), pupil (G), top point of nose alar crease (I), tip of nose alar sidewall (J) and mouth corner (K). The line through the point between inner eye sides (X) and the lip top point (Y) assumed to be the central axis of a face (XY). The lengths from the ten determined points on one side of the face to the central axis were measured (for example, JH length) and compared with the ten corresponding lengths on the other side of the face. This comparison was performed by dividing the larger lengths by the smaller ones, so each comparison has a value from 1 and more. The degree of asymmetry was determined as a sum of ten comparisons minus 10 and accepted as the proxy of beauty. Therefore, the higher this beauty proxy values, the more asymmetric the face is.

5. Methodology

We regression analysis to estimate the relation between salary and facial asymmetry. Our model is presented below.

$$salary_{ijt} = \beta_0 + \beta_1 \cdot asymmetry_i + \beta_2 \cdot goals_{ijt} + \beta_2 \cdot assists_{ijt} + \beta_4 \cdot age_{it} + \beta_5 \cdot age_{it}^2 + \beta_6 \cdot designated_{itj} + \sum season_t \cdot \gamma_t + \sum continent_i$$
$$\cdot \nu_t + \sum club_j \cdot \tau_t + e_{ijt}$$

Here i represents player, j is for team and t indicates season. Our dependent variable is salary; we estimate two regression models for base and total salary. Our set of control variables includes age, number of goals and assists per 90 minutes and binary variable of being designated player. We also include dummies for continent of birth of player, season, and club. Our main variable is the asymmetry of a player and e is the error term. An additional regression model is employed with the base salary as the dependent variable, incorporating an interaction term between the beauty proxy and star players dummy. Furthermore, we employ both semiparametric regression and quantile regression analyses to explore the intricate dynamics of the beauty effect on soccer player salaries. These methods allow to uncover detailed patterns, non-linear connections, and variations across different salary levels, enhancing the understanding of how beauty influences player earnings.

6. Empirical results

The Table 2 presents the results of the three distinct models, each focusing on different dependent variables: Base Salary and Bonus. The primary objective of these models is to investigate the influence of the beauty factor on the determination of salary among MLS soccer players. To ensure a comprehensive analysis, multiple independent variables have been introduced to control for various factors that might contribute to salary variation. These include Assists/90min, Goals/90min, Athlete's age, and Star players (designated). Additionally, the models incorporate fixed effects for Team, Season, and Continent of birth, providing a more nuanced understanding of the impact of beauty on player salaries.

The first model delves into the relationship between beauty and base salary. This model is particularly significant as it allows us to explore the beauty effect on player salaries that are fixed within the contractual agreements, independent of their sporting
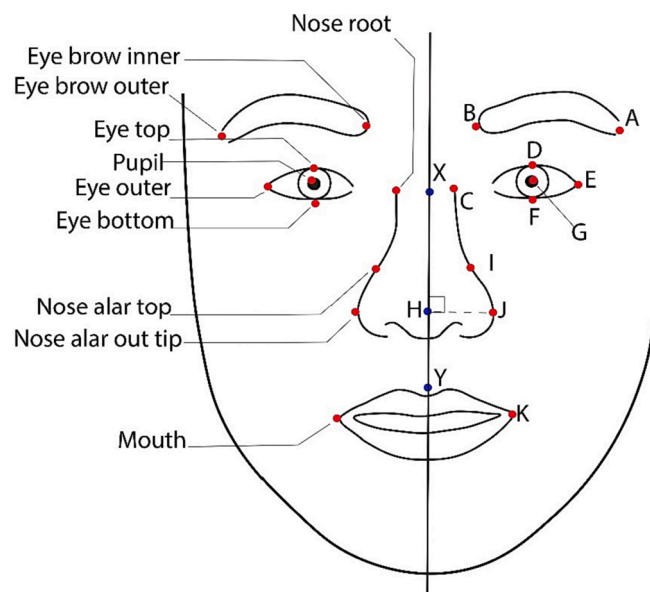

Figure 1. Points on both sides of a face (Source: Author's own figure)

Table 2
Models' estimation results

| | Dependent variable: | | |
| | **Base Salary** | | **Bonus** |
	(1)	(2)	(3)
Beauty	484,245.70**	10,746.36	48,758.75
	(184,710.60)	(212,443.40)	(41,037.57)
Beauty * Star players		1,903,480.00***	
		(452,675.50)	
Assists/90min	688,628.00**	677,383.90**	205,443.80***
	(233,541.30)	(227,784.70)	(51,886.40)
Goals/90min	212,032.50*	202,194.80*	5,709.98
	(99,085.08)	(96,664.35)	(22,013.96)
Athlete's age	38,764.44**	39,710.31**	5,935.21*
	(13,197.76)	(12,873.52)	(2,932.18)
Star players	1,444,384.00***	455,212.10	188,368.00***
	(122,318.00)	(263,759.10)	(27,175.66)
Constant	-2,463,926.00**	-1,860,529.00*	-316,872.70
	(788,689.70)	(782,466.50)	(175,225.00)
Team	Yes	Yes	Yes
Season	Yes	Yes	Yes
Continent of birth	Yes	Yes	Yes
Observations	373	373	373
R^2	0.62	0.64	0.48
Adjusted R^2	0.57	0.59	0.41
Residual Std. Error	704,175.70 (df = 325)	686,770.90 (df = 324)	156,448.30 (df = 325)
F Statistic	11.29*** (df = 47; 325)	11.99*** (df = 48; 324)	6.43*** (df = 47; 325)

Note: This table presents the results of three distinct analytical models, each examining the effect of beauty on Major League Soccer (MLS) players' Base Salary and Bonus. The models aim to explore how the beauty factor influences salary determination. To provide a robust analysis, several independent variables are included to account for potential influences on salary variation, such as Assists per 90 minutes, Goals per 90 minutes, Athlete's age, and the designation of Star players. Additionally, the models incorporate fixed effects for Team, Season, and Continent of birth to offer a detailed perspective on how beauty impacts player salaries in different contexts."
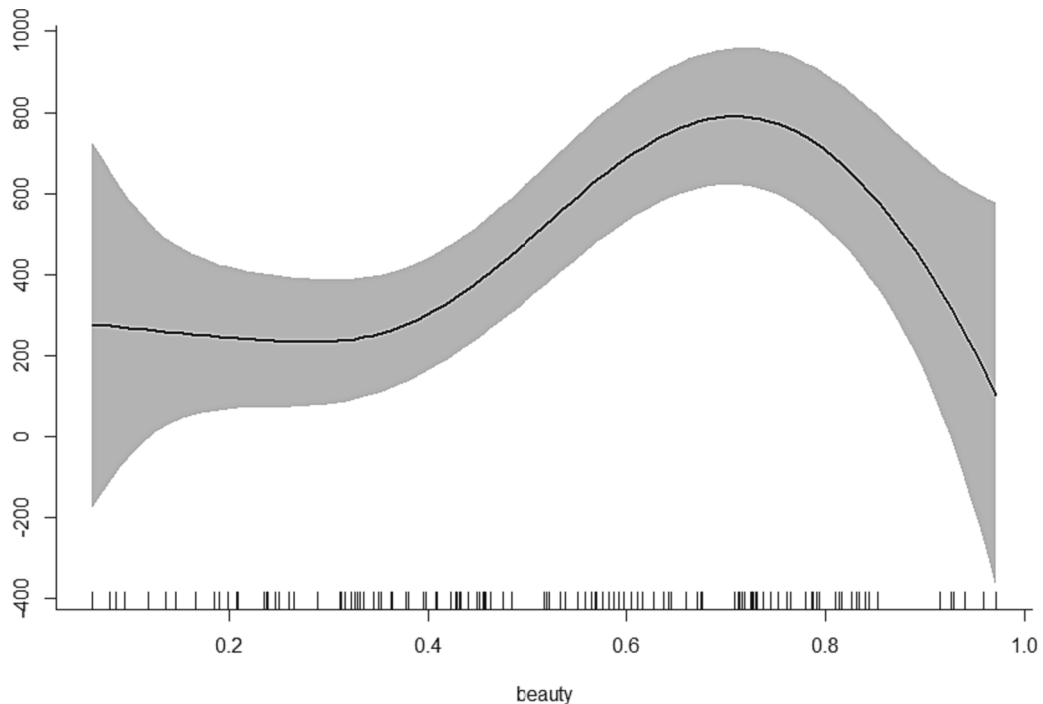
* $p<0.05$; ** $p<0.01$; *** $p<0.001$

Figure 2. Results of semiparametric regression analysis

performance. Remarkably, for the average athlete, the model reveals a statistically significant positive effect of beauty on base salary at a 0.05 significance level. This suggests that, on average, a player's physical attractiveness plays a role in determining their base salary, even in the absence of variations in sporting performance.

Moving on to the second model, the focus shifts to the additional beauty effect on star players who fall outside the salary cap regulations. The inclusion of an interaction term between beauty and star players provides valuable insights. Notably, the interaction effect of beauty and star players is found to be statistically significant at the 0.001 level and significantly greater than the average effect observed in the sample. This finding leads to the intriguing conclusion that the beauty effect is primarily driven by the 25% of star players in our dataset. These star players seem to experience a more pronounced boost in their salaries based on their attractiveness, particularly when they are not constrained by salary cap regulations.

To assess the robustness of the findings and ascertain whether the beauty effect is indeed unique to base salaries, the third model serves as a placebo test. In this model, the focus shifts to bonuses paid to players, which are directly linked to their sporting performance. As expected, the results of the third model indicate that there is no significant beauty effect on bonuses. This finding reinforces the idea that bonuses are solely influenced by on-field performance, while attractiveness plays a more substantial role in determining fixed base salaries.

These model estimations offer valuable insights into the influence of beauty on the salary determination of MLS soccer players. The presence of a beauty effect on base salaries, particularly among star players, emphasizes the relevance of non-performance-related factors in salary negotiations. By carefully controlling for various variables and employing placebo tests, these findings contribute significantly to our understanding of the complex factors that shape athlete remuneration in the context of professional soccer.

On the next steps of the analysis, we seek to go deeper in the interpretation of the results by estimating the basic model of basic salary - model 1 with the semiparametric regression (figure 2) and quantile regression (figure 3).

Semiparametric regression offers a flexible approach to modeling the beauty effect on salary determination. Specifically, we focus on Model 1, which aims to investigate the beauty factor's influence on base salary while adopting a unique feature: avoiding the imposition of strict parametric restrictions on the functional form. Unlike traditional parametric regression models, which assume specific functional forms for the relationships between variables, semiparametric regression liberates us from such rigid constraints. Instead, we allow the data itself to guide the modeling process, enabling more intricate patterns and complex interactions to emerge
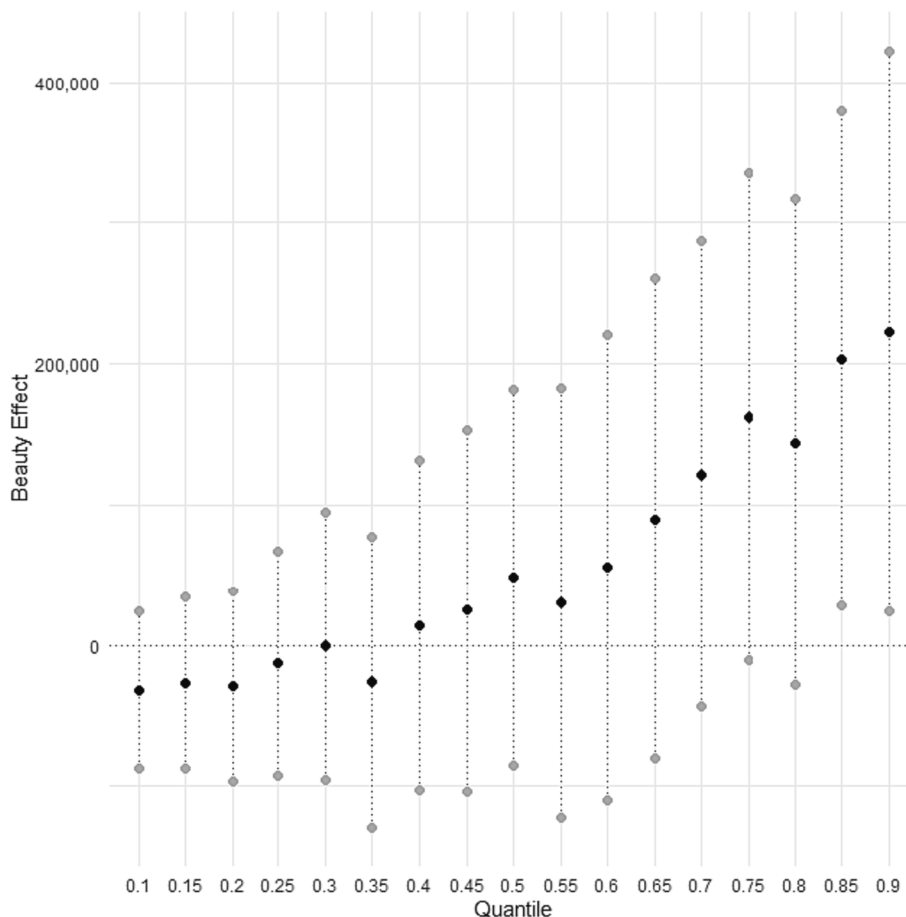

Figure 3. Results of quantile regression analysis

organically.

In this context, we harness the power of semiparametric to explore how beauty interplays with other covariates, such as Assists/ 90min, Goals/90min, Athlete's age, and Star players (designated), in determining base salaries. By not adhering to strict functional assumptions, we gain a more nuanced understanding of how beauty impacts salary beyond a linear relationship, potentially revealing hidden interactions or nonlinear effects that traditional parametric models might overlook.

The results of presented on the Figure 2. The estimation results reveal a relationship between beauty and its impact on salary determination among soccer players. The beauty effect, as observed from the data, exhibits a distinct volatility, characterized by fluctuations that are contingent upon the relative level of beauty possessed by the players. It is important to note that this effect remains significant for the vast majority of players across various beauty levels, with only the extreme tails of the beauty distribution showing a deviation from this pattern.

Interestingly, the magnitude of the beauty effect unveils a captivating trend. It appears that the effect is most pronounced and reaches its maximum when the coefficient of beauty hovers around the range of 0.7 to 0.75. This specific interval corresponds to nearly three times the average level of the beauty variable. At this critical juncture, the beauty factor seems to exert a disproportionately substantial influence on salary determination, surpassing the average impact observed within the dataset. The premium is particularly pronounced among the players with high level of beauty, suggesting that marketability and public appeal, linked to physical attractiveness, play a substantial role in salary determination at the higher end of the pay scale. Conversely, for players with lower levels of perceived beauty, this premium diminishes, indicating a more traditional salary determination based on performance and skill. These findings underscore the differential impact of beauty in salary negotiations, reflecting a nuanced interplay between physical appearance and economic valuation in professional sports.

In the pursuit of a comprehensive understanding of the beauty effect on salary determination among soccer players, the analysis delves even deeper, incorporating an advanced statistical technique known as quantile regression. This tool allows us to explore how the beauty effect varies across different levels of base salary.

Figure 3 presents the results of the quantile regression analysis, revealing specific patterns that enhance our understanding of the beauty effect. It becomes apparent that the impact of beauty on salary is not uniform across all levels of base salary. Instead, it displays considerable variation depending on where a player falls in the salary distribution.

Notably, the positive and significant beauty effect is found to be concentrated predominantly in the 0.8 and 0.9 quantiles of the base salary distribution, base salary over $345K and $953K respectively. For soccer players whose salaries fall within these upper percentiles, beauty emerges as a powerful and statistically significant determinant of compensation. This suggests that, at the higher echelons of the salary distribution, beauty plays a pivotal role in salary negotiations and significantly influences player remuneration.

This remarkable finding is in line with the outcomes of Model 2, reinforcing the notion that the average effect of beauty on salaries is primarily driven by star players who remain unaffected by salary cap restrictions. As exemplified by the quantile regression results, these star players, typically found in the higher salary percentiles, experience a particularly pronounced and positive beauty effect on their compensation.

This alignment between the quantile regression and Model 2 outcomes underscores the robustness and consistency of the findings, providing a multi-faceted perspective on the beauty effect. Together, these results substantiate the idea that the beauty effect on player salaries is not a uniform phenomenon. Instead, its significance intensifies in the upper echelons of the salary distribution, where star players reign, enjoying the benefits of the beauty premium.

7. Discussion

Our empirical findings shed light on the role of physical attractiveness in wage (salary) determination among MLS soccer players, aligning with and extending prior literature on wage (salary) determination and beauty premiums. Classic economic theories, rooted in supply and demand dynamics (Kao, 2019), have conventionally influenced salary determination models. Our study, however, adds a novel dimension by exploring the influence of beauty, an often-overlooked factor, on salaries. In line with studies on job valuation (Averett & Korenman, 1996; Hamermesh & Biddle, 1994), we find a significant beauty effect on base salaries, implying that attractiveness contributes to salary disparities even when decoupled from athletic performance. This supports the concept of latent characteristics affecting wages (Cui et al., 2019), such as productivity (Ford et al., 2018; Pfann et al., 2000) and self-confidence (Deryugina & Shurchkov, 2015; Doorley & Sierminska, 2012).

Our findings reinforce the importance of beauty in remuneration, echoing studies that demonstrate attractiveness-linked advantages in various sectors (Biddle & Hamermesh, 1998; Hamermesh & Parker, 2005; Parrett, 2015). Building on Berri et al. (2011) insights in sports economics, our study introduces a unique context of professional soccer, elucidating how attractiveness extends its influence in athletic domains. While prior research suggests a beauty premium, our results indicate its amplification among star players exempt from salary caps, similar to the findings of Guo et al. (2023) in the coaching domain. Interestingly, our quantile regression analysis corroborates this trend by unveiling the concentrated impact of beauty at the upper percentiles of the salary distribution. This reinforces the notion that beauty's influence is particularly potent among high-earning individuals.

Our study extends beyond traditional economic models by integrating semiparametric regression. Like evolutionary psychologists' assertions (Maestripieri et al., 2017), our findings reveal a non-linear relationship between beauty and salary, underlining the nuanced interplay of attractiveness in remuneration. This expands on the "taste-based" discrimination model (Maestripieri et al., 2017) and extends the discussion beyond linear relationships. By encompassing various industries and countries, our study resonates with cross-cultural research (Hamermesh & Parker, 2005; Pfann et al., 2000), emphasizing the universal nature of the beauty effect.

Lastly, this study culminates by challenging prevailing assumptions about the significance of physical attractiveness. Contrary to

earlier indications on sports, our findings unveil a beauty premium, thus revising the narrative of a beauty penalty on professional sports (Guo et al., 2023). Our results suggest that beauty yields notable advantages in this context, particularly for high-earning and well-recognized individuals, amplifying its effects. Further research can address this intriguing dynamic.

In summary, our findings show evidence of the existence of a beauty premium in salary determination among MLS soccer players. The influence of attractiveness on salaries, evident across different percentiles of the earning distribution, underscores the intricate interplay between beauty and remuneration. Our study aligns with and expands upon existing literature, providing a comprehensive understanding of how attractiveness shapes salary disparities in the dynamic of professional soccer.

8. Conclusion

In summary, our study explores the dynamic interplay between physical attractiveness and salary determination among MLS soccer players, revealing a distinct beauty premium. By broadening the scope of salary determination analysis, we introduce a novel angle by investigating the influence of beauty within the professional sports. Our findings provide robust evidence of attractiveness shaping salary disparities, particularly evident in base salaries, especially among star players. Through the incorporation of semiparametric regression, we uncover the nuanced, non-linear nature of the beauty effect, shedding light on its intricate role in shaping remuneration. In contributing to the ongoing discourse surrounding the broader relevance of attractiveness-based salary disparities, our study enriches our understanding of this complex phenomenon across a spectrum of industries and geographical contexts.

As our study opens doors for future research. Firstly, a deeper inquiry into the underlying mechanisms of the beauty premium, particularly among star players in male-dominated sports, could yield insights into the driving dynamics. Extending our investigation to other gender-dominated sectors and exploring the persistence of similar patterns would yield valuable insights into the wider applicability of attractiveness-driven salary disparities. Additionally, a comparative analysis across diverse global soccer leagues, each characterized by unique roster compositions and regulations, could provide a comprehensive understanding of the contextual factors shaping beauty-related remuneration. Investigating the interaction between beauty and other non-performance-related determinants in salary determination could further enhance our grasp of the intricate factors influencing salary differentials. Furthermore, we assume that our results about the effect of physical attractiveness on salary could have broader implications beyond sports industry, highlighting the need for further research in various contexts.

CRediT authorship contribution statement

Petr Parshakov: Conceptualization, Funding acquisition, Data curation, Writing – original draft, Writing – review & editing, Visualization, Investigation, Validation, Formal analysis, Methodology, Supervision, Resources, Project administration, Software. **Thadeu Gasparetto:** Writing – original draft, Writing – review & editing, Visualization, Investigation, Validation, Formal analysis, Methodology, Supervision, Resources, Project administration, Software. **Nadezhda Votintseva:** Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Visualization, Investigation, Validation, Formal analysis, Methodology. **Elena Shakina:** Data curation, Writing – original draft, Writing – review & editing, Visualization, Investigation, Validation, Formal analysis, Methodology, Supervision, Resources, Project administration and Software.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that support the findings of this study is publicly available in Harvard Dataverse: https://doi.org/10.7910/DVN/VGFEKY

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