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David Berri, Rob Simmons, Jennifer Van Gilder and Lisle O'Neill

The Department of Economics
Lancaster University Management School
Lancaster LA1 4YX
UK

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David J. Berri
Department of Economics and Finance
Southern Utah University

Rob Simmons*
Department of Economics
Lancaster University

Jennifer Van Gilder
Department of Economics
Ursinus College

Lisle O'Neill
Department of Economics
Ursinus College

Abstract: Previous research has shown how more attractive people reap more rewards in a variety of settings. We show that attractiveness as measured by facial symmetry leads to greater rewards in professional sports. National Football League quarterbacks who are more attractive are paid greater salaries and this premium persists after controlling for player performance.

Key words: facial symmetry; salaries; NFL quarterbacks

JEL codes: J3; J4

Corresponding author: Department of Economics, Lancaster University LA1 4YX UK, +44 1524 594234 (phone), +44 1524 594244 (fax), r.simmons@lancaster.ac.uk

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1. Introduction

In recent years researchers in the fields of economics, sociology, and anaplasty (application of reconstructive surgery) have used symmetry analysis as a method to make beauty an objective issue. People characterized by greater facial symmetry, as defined by exhibiting balanced lateral proportions, are considered to be more attractive and greater attractiveness is connected to observed outcomes. Adams and Lavoie (1974) and Clifford and Walster (1973) find that teachers give more favorable treatment to more attractive students. At mock trials, prettier people are given lighter sentences (Buck and Tiene,1989). According to Mocan and Tekin (2010) 'uglier' people have greater propensity to commit crimes. In an influential study of beauty and salaries, Hamermesh and Biddle (1994) showed that, holding all covariates equal, better looking people earn greater salary than average looking people, creating a wage premium of 5% per person. Mobius and Rosenblatt (2006) presented experimental evidence to show that physically attractive people earn higher wages, primarily because of better communication skills.

A number of studies have shown that more attractive people are perceived to be more competent and more productive in the labor market. Among the factors cited in this literature are confidence, leadership skills and social skills, all of which may be enhanced by attractiveness. More attractive individuals may possess greater self-esteem and higher levels of motivation both at school, in human capital acquisition during formative years and later on in the labor market (Mocan and Tekin, 2010). A related strand of empirical literature suggests that height can have a positive impact on salaries and other labor market outcomes (Persico, Postlethwaite and

Silverman, 2004, Case, Paxson and Islam, 2009). The latter report that the height premium is explained mostly by higher average educational achievement of taller people reinforced by sorting of tall people into occupations and industries that offer higher salaries.

2. Data and model

Our analysis of the relationship between attractiveness and earnings focuses on the quarterback – or the "face of the franchise" – in the National Football League (NFL). The NFL is a good vehicle for studying the effects of attractiveness on salary as pay levels for players are publicly available and a set of complete and accurate performance measures is also published. Confidence, leadership and height are all necessary ingredients for a successful quarterback in the NFL making it an interesting case to study.

We constructed a sample of 138 NFL quarterbacks from 1995 to 2009.[1] The *Symmeter* program[2] was then used to measure the facial symmetry of each player. The process began with the vertical and horizontal dimensions of the face. Vertically, the area consisted of the chin to the hairline. Horizontally, the entire face was selected, excluding the subject's ears. The program analyzed the symmetry of the player's face in both bilateral and radial manner. The number of pixels correlating to the mirror image of the picture generated a symmetry proportion. The NFL

[1] Headshot pictures of 138 National Football League quarterbacks from the years 1995-2009 constitute the sample for this study. All photographs were retrieved from the NFL homepage and Yahoo! Sport, therefore ensuring comparable picture quality.

[2] In 2002, Dave Davis, with the assistance of Mike Jones, developed Symmeter; a symmetry measurement tool. See http://www.symmeter.com for more information on this computer package.

quarterbacks in our sample had facial symmetry ranging from 90.36 to 99.77, where higher scores are more symmetrical.

We next turn to a model designed to explain quarterback's salaries in the NFL. The specific salary model we employ – reported in equation (1) --follows Berri and Simmons (2009):

$$\begin{aligned} \ln SAL = \; & b_0 + b_1*PYARDS + b_2*CPASSATT + b_3*EXP + b_4*EXPSQ + b_5*DRAFT1 + \\ & b_6*DRAFT2 + b_7*VET + b_8*NEWTM + b_9*\ln OFFSAL + b_{10}*PB + \\ & b_{11}*SYMMETRY + e_t \end{aligned} \quad (1)$$

Total salary (lnSAL) -- including base salary and signing bonuses – serves as our dependent variable.[3] In the NFL, unlike other professional sports, only the signing bonus is guaranteed. Players who do not perform well in the NFL will often see their salary reduced or see their position eliminated. This feature of the labor market creates a strong link between current pay and recent performance.

Our model includes a quarterback's passing yards from the prior season (PYARDS), career pass attempts (CPASSATT), total years of experience in the league (EXP) as well as experience squared (EXPSQ), whether the quarterback was taken in the first or second round of the NFL draft (DRAFT1, DRAFT2), the fact that bargaining status changes after a player has completed three years in the NFL (VET), the impact of changing teams (NEWTM), the talent around the

[3] Bonuses are given for signing, performance, and 'other' reasons. For the purposes of salary cap computation, any signing bonuses are pro-rated over the life of the player's contract, which will typically cover more than one season. The pro-rated salary measure is reported in USA Today and on Rodney Fort's website, www.Rodneyfort.com/SportsBusiness and this will be used in our empirical analysis.

player (lnOFFSAL)[4], and whether or not the player has ever appeared in the Pro Bowl (PB). To this list of variables we add our measure of SYMMETRY, which we described above. It is this variable that is our focus of interest. Table 1 reports descriptive statistics for all our variables.

We have data over player careers from 1995 to 2009 and we have 621 player-season observations over this period. This means that a given player may appear more than once in our sample. Given that our measure of attractiveness only appears once for each player, so we cannot use a fixed effects estimator, we deal with potential biases from the implicit weighting in pooled OLS estimation by collapsing our data set into career averages and re-estimating equation (1). This will serve as a robustness check on our results.

3. Results

The focus in this current study is the impact of facial symmetry. We begin by regressing log salary on symmetry, without any controls. We do so because the literature on attractiveness and salary suggests that quarterback performance may be partly a function of quarterback attractiveness. Inclusion of performance controls could mean over-controlling for the effect of beauty on salaries. From this simple regression, in the pooled sample we obtain a coefficient on symmetry of 0.089 with a t statistic of 3.73. In the smaller sample of career averages we find a symmetry coefficient of 0.109 with a t-statistic of 3.10. Then, as we add quarterback performance and other covariates the coefficients and t-statistics on the symmetry variable each decline. All control variables, including the performance measures and player characteristics,

[4] A quarterback's performance is impacted by the performances of teammates. To capture this complementarity, the team salaries of the other skill players (i.e. running backs, tight ends and wide receivers) are added for each team-season and log-transformed to give lnOFFSAL.

have significant coefficients with signs in accord with Berri and Simmons (2009). From both samples, the results reported in Table 2 show that symmetry has a positive and significant coefficient on salary at the 5% level. Facial attractiveness as captured by our symmetry data, adds to player salaries over and above performance, player characteristics and co-worker effects.

We note that when we use our sample of career averages, where each quarterback only appears once, the coefficient of symmetry in the log salary model is actually greater than for pooled OLS (0.052 versus 0.038). The impact of symmetry on salary remains at 0.038 when we re-estimate by weighted OLS and by Huber robust regression to control for outliers in the data and also when nominal salary is replaced by CPI-adjusted real salary.

On economic significance, the more conservative pooled OLS results reveal that a change in symmetry from one standard deviation below the mean to one standard deviation above (an increase of 3.16 points on symmetry score) would result in a salary increase of 11.8% ($378,000 at mean salary). Hence, a better-looking quarterback generates a substantial salary premium over an equivalent worse-looking player, purely for his physical attractiveness and regardless of his observed performance and characteristics.

4. Conclusions

Given the nature of quarterback performance in the NFL, perhaps we should not be surprised that beauty matters. One explanation of our results is that a general manager of a NFL team would benefit by hiring a more attractive quarterback, ceteris paribus. This benefit could be seen if fans have preferences for better looking quarterbacks. More attractive quarterbacks may help generate

greater luxury box revenues for their teams. Moreover, these revenues are not shared with competing teams.

Successful NFL quarterbacks are required to deploy self-confidence, leadership skills and social skills. They must communicate complex play designs to team-mates who must in turn be able to trust quarterback decisions on the field of play. Previous literature suggests that these attributes are enhanced by beauty. Our study is therefore consistent with the conjecture that attractiveness enhances earnings through these intangible skills.

Table One Descriptive Statistics

Continuous variables	**Mean**	**Standard deviation**
SALARY, $m	3.20	3.20
PYARDS	1938	1427
CPASSATT	1584	1677
EXP	6.80	3.78
OFFSAL, $m	15.70	6.00
SYMMETRY	98.07	1.53
Dummy variables	**Percentages for value = 1**	
DRAFT1	10.14	
DRAFT2	3.54	
VET	65.54	
NEWTM	37.04	
PB	22.06	

TableTwo
The Estimation of Equation (1)
Dependent Variable: Log of Salary
Years: 1995 to 2009

	Pooled OLS, n = 621		**Career Averages, n= 138**	
Variable	Coefficient	|t-stat|	Coefficient	|t-stat|
PYARDS	0.00027***	10.79	0.00058***	10.70
CPASSATT	0.00016***	4.62		
EXP	0.182***	4.22	0.170***	3.31
EXPSQ	-0.012***	5.12	-0.010***	3.60
DRAFT1	0.852***	9.09	0.888***	5.47
DRAFT2	0.180	1.06	0.081	0.37
VET	0.334***	3.09	0.162**	2.10
NEWTM	-0.430***	6.12	-0.592***	3.77
lnOFFSAL	0.421***	5.47	0.276*	1.83
PB	0.264***	3.73	0.144	1.02
SYMMETRY	0.038**	2.33	0.052***	2.61
R-squared	0.62		0.80	

Notes: Robust standard errors reported. Year dummies included.
Qualifying condition is at least 1 play in previous season; rookies excluded. *, **, *** denote significance levels of 10, 5 and 1 per cent respectively.

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