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Egon Franck and Stephan Nüesch

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Egon Franck*, Stephan Nüesch†

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Abstract

Based on the competing theories of superstar formation proposed by Rosen (1981) and Adler (1985) it is controversial if firsthand observable talent or other factors like past consumption and popularity influence stardom. This article investigates the emergence of superstars in German soccer. We use data on market values and individual player performance and publicity data to differentiate between Rosen's and Adler's theory of superstar formation. Running quantile regression we find evidence that Adler's theory applies to German soccer stars.

Key words: superstars, soccer, talent, popularity

JEL Classification: J 31, J 44, L 83

* University of Zürich, Institute for Strategy and Business Economics, Plattenstrasse 14, 8032 Zürich, email: egon.franck@isu.unizh.ch, phone: +41 44 634 28 45, fax: +41 44 634 43 48.

† University of Zürich, Institute for Strategy and Business Economics, Plattenstrasse 14, 8032 Zürich, email: stephan.nuesch@isu.unizh.ch, phone: +41 44 634 29 66, fax: +41 44 634 43 48.

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1. INTRODUCTION

While clubs overbid each other and pay enormous transfer fees and salaries for so-called superstars, other players receive comparably low remuneration. But what makes a soccer player a superstar? In the literature there are basically two competing theories of superstar formation proposed by Rosen (1981) and Adler (1985).[1] Whereas Rosen (1981) stresses clearly observable talent superiority in order to explain the emergence of superstars, Adler (1985) maintains that besides talent, also past consumption and popularity influence stardom. The question to be addressed in this paper is: Are German soccer celebrities Rosen or Adler stars? Using data on individual market values and a set of personal characteristics of all soccer players appearing in the first German league in the 2004-2005 season for more than half an hour, we differentiate between Rosen's and Adler's theory of superstar formation. We define superstars as a relatively small number of players who are very valuable to their club. Strictly speaking, superstars in German soccer are players whose market values are in the top 5% quantile of the league's market value distribution. Running quantile regression we find empirical evidence that variables associated to Adler's theory contribute to the explanation of market value differentials in German soccer.

The remainder of the paper is organized as follows. Section 2 illustrates the two alternative theories of superstar formation. Section 3 presents the related literature. In section 4 we motivate our hypothesis. Subsequently, we explain the main features of the data and give some stylized facts on German soccer. The variables and the method used as well as the results are presented in section 6. Section 7 concludes.

[1] MacDonald's theory of superstar formation is not treated separately in this paper, since he basically presents a dynamic version of Rosen's superstar model (MacDonald, 1988).

2. THEORIES OF SUPERSTAR FORMATION

Theories of superstar formation agree that superstars emerge in the provision of certain services where large economies of scale on the supply side are combined with high appreciation on the demand side.

The technology of soccer games facilitates the reproduction of the service at low cost. The cost of production is largely independent of the size of the audience (Lucifora & Simmons, 2003). Since most of the costs are up-front, average costs decrease with consumed output. Large soccer stadiums and various media allow many paying spectators to observe a soccer game simultaneously, while at the same time enabling teams to exclude non-paying customers. Thus, there are no issues of free riding due to non-exclusion. The World Cup, the European Championship or even just a game of the German Bundesliga can attract a remarkably large audience all over the world by television broadcast. As a result of these large economies of scale, only few sellers are needed to serve the whole market. However, large economies of scale do not guarantee high salaries for a restricted number of players. In addition, these players have to be perceived as very scarce so that demand becomes highly concentrated on their services (Rosen & Sanderson, 2001).

While on the supply side both Rosen (1981) and Adler (1985) agree on the necessity of large economies of scale, their explanation of the demand for superstar services is different. Rosen (1981) considers a performer's talent as costlessly observable to all potential consumers. Since lower talent is an imperfect substitute for higher talent, the artist or sportsman who has slightly higher talent than his competitors may attract the whole market demand under ceteris paribus conditions.

Adler (1985) explains the phenomenon of superstars as a learning process that occurs if consumption requires knowledge. A performer's talent is rather considered as a hidden characteristic than as a clear feature. Based on the notion of "consumption capital" introduced by Stigler and Becker (1977), Adler (1985) argues that appreciation increases with knowledge: "… the more you know the more you enjoy" (Adler, 1985, p. 208-209). Stigler and Becker (1977) use good music as an example of how past consumption activities lead to beneficial addiction through an accumulation of consumption capital. By having exposed themselves to good music in the past, consumers have built up consumption capital that enables them to derive more pleasure from listening to good music in the present. Adler (1985) extends this well-known Stigler/Becker-framework by adding the element of discussing consumption with likewise knowledgeable individuals. A person interested in soccer may increase player specific knowledge by both watching games (Stigler/Becker-effect) and discussing it with other people who know about it (Adler-effect). The more popular the sportsman in question is, the lower the searching costs to find competent discussants will consequently be. These positive network externalities explain why stars may even emerge among equally talented performers. Searching cost economies imply that one is always better off patronizing a well-known star as long as other sportsmen are not perceived as superior by an order of magnitude. Given that consumers face certain budget constraints, the more popularity a specific player already enjoys, the more player specific consumption capital will be accumulated. In Adler's theory the demand for superstar services depends both on hidden talent characteristics and on consumption capital which itself is affected by both past consumption (Stigler/Becker-effect) and the player's popularity (Adler-effect). Hence, a potential advantage in knowledge about the talent of a non-star would have to be balanced against the higher searching costs for discussants if one were to abandon the already popular star.

According to Adler (1985), luck (by luck, he means factors other than talent) determines who amongst equally talented people will snowball into a star. Stars may be born because initially (slightly) more people happen to know one player than any other players of possibly equal talent. However, more than twenty years later, Adler (2006) dismisses the idea of luck as the only possible mechanism driving the initial selection among equally talented people. Just as the suppliers in other businesses prone to superstar effects, sportsmen too do not usually entrust this choice to pure chance. Instead, they consciously use publicity, such as appearances on talk shows and coverage in tabloids, magazines and the Internet to strengthen their popularity. Adler (2006) emphasizes that the acquisition of consumption capital occurs not only by exposure to the activity itself, or through discussing it with friends or acquaintances, but also by reading about it in newspapers, magazines and the Internet.

3. RELATED LITERATURE

The theories of superstar formation have their origin in the field of arts[2], which was also the subject of various empirical investigations of superstar effects (e.g. Hamlen, 1991; Hamlen, 1994; Chung & Cox, 1994). Schulze (2003), however, mentions that in sports the empirical analysis of the superstar phenomenon is even more promising, because in most sports talent is easier to measure than in art or entertainment activities.[3] Hausman and Leonard (1997) were the first to empirically analyze superstar effects in professional sports.[4] They found out that the mere presence of stars had a substantial positive impact on club revenues, even after

[2] Rosen (1981) uses examples of full-time comedians or classical music, and Adler (1985) mentions singing and painting as artistic activities generating superstars.

[3] Seaman (2003) analyzed the similarities between the arts and the sports literature. He strongly suggests fruitful collaboration and extensive cross-referencing between these two areas of application.

[4] Scott, Long, and Scompii (1985), Brown, Spiro, and Keenan (1991), as well as Burdekin and Idson (1991) already controlled for the effect of a team's star attraction in their analyses of match attendance prior to Hausman and Leonard (1997). However, they did not emphasize the superstar effects. Of these studies only Brown et al. (1991) were able to find a statistically significant relationship between a measure of consumer demand and a team's star attraction.

controlling for team quality measured by the number of All-Star players in a team. By analyzing all NBA local and national television ratings as well as match attendances, Hausman and Leonard (1997) singled out that – back in 1993 – the estimated value of Michael Jordan for the National Basketball Association (NBA) was $53 million. Berri, Schmidt, and Brook (2004) extended the work of Hausman and Leonard (1997) by investigating the two-sided relationship between match attendance and both team performance and the team's employment of star players in the NBA. Their results suggest that it is performance on the court, not star power, which attracts the fans. However, both the paper of Hausman and Leonard (1997) and the study of Berri et al. (2004) only cover superstar effects on a team level and not on an individual basis. The question why superstars arise is faded out.

Using longitudinal individual data from two North American team sports leagues – the National Hockey League (NHL) and the National Basketball Association (NBA) – Frick (2001) analyzed the salary differentials between superstars – defined as players who received all-star vocations – and "benchwarmers". His results show that performance measures like the numbers of scores, rebounds, steals, assists or blocks are good predictors of the observed salary differentials. Frick (2001) found evidence for Rosen's explanation of superstars. However, a final answer whether Rosen's or Adler's theory of star formation applies is still open. His empirical investigation does not differentiate between these two standpoints, since variables measuring the Adler-effect are missing in the set of independent variables.

Lucifora und Simmons (2003) investigated wage determination looking for superstar effects among professional soccer players appearing in the Italian league. The authors used rare data on individual salaries as dependent variable and individual performance indicators,

experience, reputation and team quality as regressors. They found empirical evidence for Rosen's theory. Talent – measured by goals and assists – exercises significant influence on the skewness of the salary distribution of Italian forwards and midfield players. Lucifora and Simmons (2003) do not control for popularity.

Lehmann and Schulze (2005) tested the competing predictions of existing superstar theories in German soccer. Using various measures for individual player's performance and an indicator for media presence they find that neither performance nor publicity can explain the salaries of superstars. Our study extends the paper of Lehmann and Schulze (2005) in several ways: Firstly, we divide a player's performance into firsthand observable talent measures which are identifiable without costs, and indirect quality measures capturing hidden talent characteristics. Secondly, indicators for past consumption and three different popularity measures that specify media presence in more than 20 German newspapers and magazines as well as publicity in the Internet are included. Thirdly, we use market values as endogenous variable since they are a proxy for the total value generated by a player. In this sense they can be interpreted as incorporating salaries, signing fees, bonuses, potential transfer fees and a remaining producer surplus. And last but not least, the analysis of our unique data set delivers new results. We are able to find empirical evidence for Adler's superstar theory in professional team sports.

4. HYPOTHESIS

Both Rosen (1981) and Adler (1985) believe that talent is an important determinant of stardom. However, while in Rosen's sense superstars necessarily have superior talent, Adler (1985) delivers an explanation which allows for the superstar phenomenon to arise even among equally talented people. Rosen (1981) treats talent as observable without cost by all

economic agents, while Adler (1985) makes clear that superstars only exist if the consumption of their services requires knowledge. According to Adler (1985), a player's talent is a hidden characteristic that has to be discovered through personal and interpersonal learning processes. The appreciation of a particular player grows with the knowledge consumers have acquired about him. The assumption of observable talent marks a key difference between Rosen's and Adler's theory. The appropriateness of a certain theory, therefore, largely depends on the relevance of knowledge for consumption.

In individual sports talent is generally more observable than in team sports. In an Olympic 100 meter sprint finale for example, there is less uncertainty about its participants' talent than in a soccer game. Talent is clearly measured by milli-seconds which tip the scales between success and loss. Consumers do not need specialized knowledge to single out the best sprinter. In line with Rosen (1981) even small differences in talent are leveraged into disproportionate differences in earnings.

In team sports like soccer, however, every game is a team product. Team production is characterized by the fact that it is difficult to determine each individual's contribution to the output of the cooperating inputs (Alchian & Demsetz, 1972). Soccer is a highly interactive game based on the combination of complementary player skills. Together with relatively low scores and limited 'set' plays, the interactivity does not facilitate decomposition, record and measurement (Carmichael, Thomas, & Ward, 2000; Carmichael, Thomas, & Ward, 2001). A playing team consists of one goalkeeper plus ten outfield players who can generally be categorized as defenders, midfielders and attackers. A player's performance always depends on complementary skills of other team-mates. Even the best goalkeeper hardly manages to impede opposition's goal scoring, if the defense is virtually nonexistent. Or even outstanding

attackers become lame ducks if they are not supported by offensive passes of midfielders or defenders. In soccer, all outfield players are involved in all aspects of the game to varying degrees. A player's talent involves many hardly measurable capabilities like passing the ball to free-standing team-mates, retaining possession of the ball, running or dribbling with the ball, creating goal-scoring chances, tackling opponents, blocking or intercepting opposition's passes and shots, or clearing the ball from pressure situations (Carmichael et al., 2001). The exact talent of a soccer player is fuzzy and requires much player specific knowledge to be properly discovered and assessed. We therefore expect German soccer players to be Adler stars whose market values depend on hidden talent characteristics, past consumption of the consumers and the player's popularity.

5. DATA AND STYLIZED FACTS ON GERMAN SOCCER

In contrast to US leagues, which are generally 'hermetic', the composition of European soccer leagues changes annually through promotion and relegation. The best teams from a lower league are promoted to the next higher league, while the weakest in the latter are demoted to the next lower league. Due to the profile of the first Bundesliga as the highest German soccer league, we rule out superstar status to players appearing in lower leagues. While the first Bundesliga had an average match attendance of 35'183 in the 2004-2005 season, the next lower league only attracted 12'074 fans on average.[5] For the empirical analysis we concentrate, therefore, solely on players of the first Bundesliga. Our sample contains all players who played for at least half an hour during the 2004-2005 season[6] – in total 427 players. These players or rather their teams generated an estimated turnover of €1.1 billion in

[5] Average match attendance was calculated by the *Kicker* soccer magazine.

[6] Unfortunately, we were not able to include further seasons because popularity data on previous seasons was partially not available.

the 2004-2005 season. The first German league is the third largest European soccer league after the English Premier League and the Italian Serie A (Jones, 2005). We chose the German league because of its well documented games in the specialized press and two independent institutions that assess the market values of all players appearing in the first German league. Data on a set of personal player characteristics (e.g. goals, assists, appearances, tactical position, team, age, or race) is available from two special editions of the *Kicker* soccer magazine covering the 2004-2005 season.

The analysis of the market values of 427 players appearing in the first German league reveals a highly unequal distribution with a substantial skewness. The Gini-coefficient is 0.56, which indicates high inequality. The market value of Michael Ballack, who was the winner of the "Player of the Year"-award[7] in the 2004-2005 season, amounts to €30 million. This corresponds to 600 times the lowest market value in the sample equaling €0.05 million. The skewness of the distribution is lower than in many individual sports like for example in tennis,[8] but higher than in other team sports like in American football, baseball, hockey or basketball.[9] The earnings distribution in individual sports is expected to be more skewed than in team sports, because in individual sports no prize money awaits the bottom finisher, but at least a minimum salary is available to rookies in team sports (Scully, 1995). The fact that the distribution of market values in European soccer is more skewed than the distribution of salaries in typical US team sports at least partly depends on the different institutional restrictions in the US leagues (e.g. salary caps).

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[7] "Player of the Year" is an award assigned by sports journalists to the best player in the German league or the best German player in any other league.

[8] In 1997 Kubat (1998) calculated a Gini-coefficient of 0.73 for the distribution of prize money to tennis players.

[9] Scully (1995, p. 74) provides an extensive analysis of the distribution of player earnings in the US Major Leagues: The listed Gini-coefficients for the US Major Leagues vary between 0.22 (Hockey, 1978) and 0.51 (Baseball, 1990).

6. EMPIRICAL FRAMEWORK

6.1 Dependent variable

The dependent variable in our study is the logarithm of a player's market value at the end of the 2004-2005 season. The used market values are estimated by industry experts of a team independent institution.[10] Market values do not only incorporate salaries but also signing fees, bonuses, transfer fees and a remaining producer surplus. They reflect the total value generated by a particular player for his team and equal, therefore, the team's maximal willingness to pay. The player himself appropriates a part of this value through salary payments, bonuses and signing fees,[11] whereas the selling club receives potential transfer fees. The buying club retains a possible producer surplus. However, the used market values do not include individual endorsement fees.

In order to explore the reliability of the used market value data, we compared it with the market values provided by a second independent source. The two estimations are strongly correlated (correlation is 0.89), which indicates high reliability.[12]

6.2 Independent variables

We distinguish between four groups of independent variables: Talent variables, variables of past consumption, popularity variables and control variables. While the first three groups of

[10] The name of the institution is available upon request.

[11] Unfortunately data about salaries, signing fees, bonuses, or transfer fees is not available in grand scale. In the 1999-2000 season, salary data of players appearing in the German league was collected and published in a special edition of the magazine *Sportbild* (Lehmann, 2000; Schulze & Lehmann, 2005) and in the newspaper *Welt am Sonntag* (Kern & Süssmuth, 2005). However, these salaries do not include any bonuses, signing fees, or transfer fees.

[12] In addition, the Pearson χ^2 independence test rejects independency at the 0% level of significance. Thus, the two institutions seem to deliver corresponding data.

variables are employed to differentiate between the Rosen-, Stigler/Becker- and the Adler-effect, the control variables are used to eliminate alternative explanations such as age, contractual status, race, and club or position characteristics.

In soccer, one performance characteristic that is clearly identifiable and measurable is goal scoring. The number of goals scored by each team of a particular fixture including those unintentionally scored by the opponent team determines the result of a game. Goal scoring and preventing the opposition to score are the critical success factors in a soccer game. Even though there are many constructive elements in a game which enable the teams to score goals, the public's attention is largely concentrated on the players who finally score. There is no need for specialized consumer knowledge in order to ascertain the goal scorer. Since the sequence of goal scoring is replaid and analyzed several times in the live broadcast of a game, in the television newscast or on large screens in modern stadiums, not only the goal scorer but also the player making the final pass (called assist) prior to a goal being scored is easily identified. Thus we label GOALS and ASSISTS as firsthand observable talent measures, because they are clearly identifiable and measurable by the spectators without requiring significant specialized knowledge. They fit into Rosen's conception of talent that is based on factors observable without cost. In contrast to the study of Lucifora and Simmons (2003) our firsthand observable talent measures GOALS and ASSISTS are not constructed as per game ratios, because the mere fact of low appearances should not have a positive impact on these performance measures. According to the law of large numbers, starters would have a lower chance to randomly achieve high scores than newcomers if the firsthand observable talent measures were per game ratios. As firsthand observable talent measure for goalkeepers we used OPPGOAL counting the number of opponent's goals per game of a particular goalkeeper. Here we employed OPPGOAL as per game ratio to control for the effect that the

number of opponent's goals increases on average with the number of appearances, even though the latter is generally a sign of high talent.

A completely different set of talent variables is needed to control for the possibility that soccer celebrities are Adler stars. In an Adler conception of the star phenomenon, talent is not easily identifiable because it is rather hidden than observable. Talent depends on many hardly measurable factors like e.g. physical characteristics, fitness, form, technical and social abilities and motivation. Thus, assessing a player's true talent may imply a learning process that requires a lot of observations, reading and discussions with other competent individuals. In order to handle this complexity, consumers often rely on indirect talent indicators like expert opinions. Reinstein and Snyder (2005) show that expert opinions are an important source of "product" information especially for goods with high quality uncertainty. In European soccer, expert opinions often appear as comments by professional critics or journalists. They deliver valuable information that help consumers to indirectly assess a player's talent.

We use three different expert appraisals in our study: Average match evaluation published by the *Kicker* soccer magazine (GRADE), votes for the "Player of the Year"-election among sports journalists (PLAYOTY), and membership of the national team (NAT).

In German soccer every match performance of a player who plays more than half an hour is individually evaluated by sports experts. The grades, which are published in the *Kicker* soccer magazine, vary between 1.0 (excellent) and 6.0 (very bad). But since we use the average grade of all evaluated match performances in our study, the variable GRADE spreads only from 2.5 to 5.

The *Kicker* soccer magazine also organizes an annual voting for the "Player of the Year". At the end of the 2004-2005 season approximately 3400 sports journalists were asked to vote for any player in the German league or any German player in any other league. PLAYOTY measures how many votes a player received. In total 995 valid votes entered the investigation. Compared to the variable GRADE the measure PLAYOTY considers more general overview impressions of players than precise match analyses.

An additional indicator of exceptional talent is the membership of the national team. The national coach and his assistants screen potential players and select the most talented ones to form an excellent team for international team competitions like the European Championship or the World Cup. The membership of the national team is thus a sign of a remarkably high talent.[13].

The variables measuring appearances in the first German league during the 2004-2005 season (APP) and prior to that season (PRIAPP) are used as proxies for past consumption. According to Byers, Peel, & Thomas (2001) spectators range in type from the committed regulars, who make up the "core" of attendance, to the "floaters" whose attendance is determined by the attractiveness of a particular fixture. Since the percentage of attendance having a season ticket varies between 10% and 40% (Roy, 2004), we assume that the "core" of a club support attending match after match regardless of the team's current form or star attraction is small. Most of the fans are "floaters", however, within the same league. Potential accumulated knowledge, therefore, depends on the number of appearances in the first German league.[14] The more often a particular player appeared on field, the higher is the expected consumption

[13] We also tried to weight the national membership dummy with the *FIFA*-Ranking of the particular team in order to consider quality differences between national teams. However, this did not change our results in any significant way. Due to the ease of interpretation we use the unweighted dummies.

[14] We assume that past consumption of player performances in foreign leagues is negligible.

capital a fan may have accumulated. Not only the current productivity attracts fans but also memories of past performances (Rosen & Sanderson, 2001). In order to specifically analyze the consumption capital of the "core" of a team support, we also experimented with the separate effect of appearances for the present team only. However, we dropped this (insignificant) variable from our model because long contract duration of a player does not only facilitate the accumulation of player specific consumption capital, it also seems to be a sign of low talent.[15] The work of Carmichael, Forrest, & Simmons (1999) shows that favorable performance measures increase the probability of being transferred. Unfortunately, more detailed variables measuring past consumption are not available. It is impossible to quantify the amount of time effectively used by all potential spectators in watching a particular player. As a result of missing alternatives we use APP and PRIAPP although potential distortion could result from a direct talent enhancing effect due to greater field experience.[16]

The Internet offers new and promising indicators of the popularity of a player. We collected data whether a player has a personal homepage (HOMEP) which provides the opportunity to directly address large groups[17] with personal statements, personal characteristics or club information. In summer 2005, 23% of the players already ran a personal homepage and several planned to start one. We held an extensive interview with the head of a company that operates every fourth homepage in our sample.[18] He told us that the main reason why players instruct him to design and operate a personal Internet platform is to have a channel of

[15] Lehmann (2000), who analyzed wage determination in the first German league, found no significant influence of the appearances for the present team on salaries.

[16] Lucifora and Simmons (2003) used the number of appearances as a variable measuring the experience of a player.

[17] The homepages of well-known players are visited more than 100'000 times a month.

[18] The interview was held on 18th August 2005.

information which is self-controlled and suits, therefore, best to put oneself in the right light. Nowadays, personal Internet platforms are indispensable in comprehensive public relation activities in order to increase one's own popularity.

General publicity in the Internet was measured by the logarithm of results given by the *Google* search engine (LNGOOGR) searching for "name" and "Bundesliga".[19] If there were multiple players having the same name, we included the first name in the search job too. Thus, we minimized potential distortion to an acceptable level.

In addition, we analyzed the media presence in the German press. The variable PRESS indicates how often players are quoted with name and first name[20] in over 20 German newspapers and magazines between the first July 2004 and 30th June 2005.[21] In Table 1 the whole set of variables as well as the descriptive statistics are listed.

[19] Both data on homepages and the results of the *Google* search were collected between 25th and 30th August 2005.

[20] This way we minimize the distortions coming from the short match reviews in which players are quoted only by name. We excluded citations by name alone in order to prevent issues concerning multicollinearity with appearances and scores.

[21] The used database contains quality nationwide newspapers (including Frankfurter Allgemeine Zeitung, Süddeutsche Zeitung, Stuttgarter Zeitung, Hamburger Abendblatt, Die Welt, taz, Berliner Morgenpost, Financial Times Deutschland) and weekly magazines (including Der Spiegel, Stern, Bunte).

Variable	*Description*	*Mean*	*SD*
Dependent variables			
LNVALUE	Logarithm of a player's market value	14.13	1.09
Independent variables			
Talent variables			
Firsthand observable talent measures:			
GOALS	Goals	2.07	3.46
ASSISTS	Assists	1.75	2.50
OPPGOAL	Opponent's goals per game of a goalkeeper	0.12	0.42
Indirect talent measures:			
GRADE	Average match grade by the *Kicker* sports magazine	3.77	0.46
PLAYOTY	Votes for the "Player of the Year"-election for the 2004-2005 season	2.09	25.69
NAT	Membership of the national team (dummy)	0.32	
Proxies for past consumption			
APP	Appearances in the 2004-2005 season	19.33	9.94
PRIAPP	Accumulated appearances prior to the 2004-2005 season	67.23	76.91
Popularity variables			
HOMEP	Personal homepage (dummy)	0.23	
LNGOOGR	Logarithm of results of the google search	9.32	1.10
PRESS	Citations in over 20 German newspapers and weekly magazines	155.83	266.35
Control variables			
AGE	Player's age	27.31	4.18
AGESQ	Squared term of AGE	763.39	232.12
LASTY	Contract ends in summer 2005 (dummy)	0.34	
LASTBOY	Contract ends in summer 2006 (dummy)	0.27	
FOREU	Foreign player from a European country (dummy)	0.41	
FORNONEU	Foreign player from a non-European country (dummy)	0.12	
ATTACKER	attacker (dummy)	0.24	
MIDFIELD	midfielder (dummy)	0.35	
DEFENDER	defender (dummy)	0.33	

Note: The model also includes 17 team dummies that are not reported.

Table 1: Variables and Descriptive Statistics

We use several control variables to eliminate alternative explanations, such as age, contractual status, race, team effects or position effects. We control for age (AGE) because several studies show that a player's age has a positive but diminishing impact on salaries (Lehmann & Weigand, 1999; Frick, 2001; Lucifora & Simmons, 2003). To capture this nonlinearity we also control for age square (AGESQ). Even though empirical studies of North American Major Leagues typically do not include both appearances and age, in European soccer it is appropriate to utilize age and appearances separately, because players are not drafted and can,

therefore, enter the industry at many different ages. Using age and experience together does not generate multicollinearity (Lucifora & Simmons, 2003).

In addition, we control for the contractual status of a player using two dummy variables. The first dummy variable (LASTY) indicates if the contract ends in summer 2005 (coded 1) and the second (LASTBOY) if the player contract ends in summer 2006 (coded 1). The impact of contract duration on market values is controversial: some scholars (e.g. Lehn, 1982; Scoggings, 1993) say that guaranteed multi-year contracts reduce player effort due to a moral-hazard effect while others (e.g. Kahn, 1993; Maxcy, 2004) argue that only the better players receive comparably long contracts (self-selection effect).

Two dummy variables concerning a player's race are included: FOREU coded 1 for European players that are not German and FORNONEU coded 1 for non-European players. Since cost considerations (screening costs, mobility costs etc.) speak for hiring the German player among two equally talented players, we predict that non-German players who actually got engaged in the German league have superior talent and thereby higher market values. In addition, the variable FORNONEU also controls for the effect that German teams are still not allowed to select more than three non-Europeans to simultaneously play in a game. By restricting the number of non-European players, this regulation has the effect that only the very best from the talent distribution of non-Europeans will be employed at all.

We take account of team-specific effects by using team fixed effects estimations assigning unobserved team effects to team dummies. Team effects are supposed to have significant influence on player market values (Idson & Kahane, 2000). Somebody who is in the squad of

the team winning the championship race enjoys much greater publicity and finances than someone in the team being relegated to the next lower league.

Position dummies are used to control for specific effects resulting from the tactical position of a player. Lehmann and Weigand (1999) for instance find evidence that in the German league midfielders earn significantly more money than other players.

6.4 Results

Since we investigate superstar emergence, we want to test the influence of the independent variables at the top end of the market value distribution.[22] The OLS procedure that tests on the mean value will, therefore, not be able to capture the superstar phenomenon correctly (Lehmann & Schulze, 2005). Quantile regression, developed by Koenker and Bassett (1978), minimizes an asymmetrically weighted sum of absolute errors, where the weights are functions of the quantile of interest – in this study the 95% quantile. The standard errors are estimated using the bootstrap procedure.[23]

[22] Whenever correlational designs are used, concerns about internal validity such as possible reverse causality may be raised. However, since most of the independent variables concern the whole 2004-2005 season, while the market value data was estimated at the end of the 2004-2005 season, the issue of reverse causality is appeased by this lag structure.

[23] We ran 1000 replications so that the estimates of standard errors are rather stable (see Koenker & Hallock, 2000).

Variable	*β-coef.*	*Std. Error*
GOALS	0.0244	0.0227
ASSISTS	-0.0006	0.0284
OPPGOAL	-0.3149	0.4785
GRADE	-0.3345 *	0.1511
PLAYOTY	0.0001	0.0072
NAT	0.0571	0.1560
APP	0.0152 *	0.0079
PRIAPP	-0.0016 +	0.0011
HOMEP	0.2061 +	0.1346
LNGOOGR	0.1359 *	0.0646
PRESS	0.0011 **	0.0004
AGE	0.5260 **	0.1540
AGESQ	-0.0098 **	0.0028
LASTY	0.0053	0.1295
LASTBOY	-0.0770	0.1262
FOREU	0.3512 *	0.1409
FORNONEU	0.2750	0.2081
ATTACKER	0.0026	0.7883
MIDFIELD	-0.2590	0.7514
DEFENDER	-0.0011	0.7379
Constant	7.6652 **	2.2901
Team fixed effects	yes +	(F-value: 1.60)
Pseudo R^2	0.57	
Number of observations	427	

Note: Significance levels: + 10%, * 5%; ** 1%; Significance tests are one-tailed for directional independent variables and two-tailed for control variables.

Table 2: Estimates of the Logarithm of a Player's Market Value Running a 95% Quantile Regression

The results in Table 2 show that scoring one more goal per season increases the star's market value in the 95% quantile by 2.4%.[24] The market values of superstar goalkeepers are reduced

[24] However, we have to be cautious with the generalization of the interpretation, since it implies that a person who happens to be in the 95% quantile of one conditional distribution will also find himself in the same quantile had his independent variables changed (Buchinsky, 1998).

by 31.5% if they receive one more goal per game. However, firsthand observable talent measures GOALS, ASSITS and OPPGOAL are all insignificant.[25]

The average grade of the match evaluations given by *Kicker* sports journalists strongly influences a player's market value at a 5% level of significance. The more favorable the evaluations become (this means a low grade), the higher the demand for this player. If the grade of a player in the 95% quantile is one score better on average, the market value increases by 33.5%. The coefficient of the variables PLAYOTY and NAT have the expected positive sign. The membership of a star player in the national team increases his market value by 5.7%. However, both PLAYOTY and NAT are statistically insignificant. It seems that the accurate match evaluations better detect and represent the talent of a player than rather global judgments of sports journalists or of the coaches of national teams.

Analyzing the variables of past consumption, we see that the number of appearances in the 2004-2005 season (APP) correlates with the dependent variable at a 5% significance level. The stronger fans specialize on a particular star player, the higher the appreciation of this player gets. The coefficient of the variable PRIAPP measuring prior appearances is negative (at the 10% level of significance). It seems that only recent experience displays positive influence on market values.[26]

A special focus of our study lies on the popularity variables. Table 2 shows that all popularity measures used in our study exercise significant positive impact on a star's market value. The existence of a personal homepage (HOMEP) increases a star's market value by 20.6%. One percent more hits in the *Google* search enhance the demand for star players by 0.14%. And every press citation leads to an increase of 0.11%. Concerning statistical significance, PRESS

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[25] The result does not change if interaction terms between GOALS and ASSISTS with tactical position dummies are used.

[26] Appearances can also be interpreted as an indicator of the star's (not the consumers') experience that might be subject to diminishing (or even negative) returns.

is the strongest predictor, followed by quotes in the Internet (LNGOOGR) and the existence of a personal homepage (HOMEP).

The significant influence of the control variables AGE and its square confirms what a general human capital earnings function would predict: The market value of star players rises with age but at a decreasing rate. The turning point for players in the 95% quantile is at the age of 26.8 years. Beyond that age, higher consumption capital is in general offset by worsening talent concerning physical performance, reduced speed and fitness.
The analysis of the control variables FOREU and FORNONEU confirms our prediction that overall non-German players have higher market values than German players. The premium for non-German European star players with 35.1% is even higher than for non-Europeans stars with 27.5%. The latter coefficient is not significant.

All in all we find evidence that Adler's theory of superstar emergence is supported for soccer players whose hardly measurable task requires player specific knowledge in order to be properly evaluated and appreciated. Therefore, the market values of soccer stars are clearly driven by expert appraisals concerning their talent, by past consumption opportunities and by the star's popularity.

7. CONCLUSION

Rosen's theory of superstar formation stressing the importance of firsthand observable talent is not supported for German soccer stars. Easy measurable and identifiable talent indicators like goals and assists have no significant impact on their market values. The specific contribution to a soccer game and hence the exact talent of a star player is indeed difficult to determine. A soccer match is a typical team product. It seems that the assessment of soccer

players requires specific consumption capital as stipulated by Adler's theory of superstar emergence. The market values of German soccer stars are better predicted by expert evaluations revealing hidden talent characteristics than by firsthand observable talent measures. We also find clear empirical evidence that both past consumption of the spectators (Stigler/Becker-effect) and the player's popularity (Adler-effect) are significant predictors of the stars' market values. Publicity in the press and in the Internet increases demand. We believe that the predictive power of the popularity measures is even underestimated in our study, because the used market values did not include any individual endorsement fees which are highly contingent on a player's popularity.

If Adler's theory holds, two different strategies for becoming a superstar arise: players can either intensify their investments in physical talent in order to receive better expert appraisals or they can make higher popularity investments. The best example for a player following the second strategy is David Beckham, who was seen as the world's most famous soccer player in 2004. He was never winner of the "FIFA World Player of the Year"-award[27] and hardly any soccer expert considers him as the world's most talented player. Nevertheless, David Beckham led the Forbes list 2004 of the highest-paid soccer player.[28] In summer 2004 he switched teams from Manchester United to the Spanish club Real Madrid in a $41 million transfer. Real Madrid signed the soccer star not so much for his on-the-field prowess, but for his ability to attract fans, in particular in Asia. In Japan, Beckham has already achieved name recognition of over 90% (James, 2003). Beckham consciously presents himself not only as a

[27] "FIFA World Player of the Year" is a soccer award annually given to the male and female player who is thought to be the best in the world based on votes by coaches and captains of international teams.

[28] See for this information *www.forbes.com/athletes2004* visited on second October 2005. Forbes earning estimates include salaries, bonuses, prize money, endorsements and appearance fees.

soccer star but as a pop icon as well. His face has launched a thousand of tabloids and his marriage with a famous pop singer definitively made him a celebrity gold.

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