CAREER DURATION IN A COMPETITIVE ENVIRONMENT:

THE LABOR MARKET FOR SOCCER PLAYERS IN GERMANY

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INTRODUCTION AND RESEARCH QUESTION

In most professional team sport leagues in Europe the institutional environment has changed from time to time in a response to changes in product and/or labor market conditions. While these changes have been described in a number of monographs[1] and their impact upon teams has been analyzed in a number of detailed case studies, their influence on (the careers of) individual players remains largely unexplored. This is surprising insofar as most of the changes that have occurred over the last three or four decades are likely to affect the players much more than either the teams or the consumers. Thus, the aim of our paper is to conduct an econometric analysis of the (changing) dynamics of the market for professional soccer players in Germany, covering the period 1963/64 (when the German "Bundesliga" was established) until 2002/03.

While individuals who have made it into one of the North American major leagues are threatened by upcoming youngsters only, the relegation system that is being used across all Western European team sports leagues has an additional threat to the teams' athletes:[2] being on the roster of one of the poorly performing teams may mean that a talented and successful player has to leave the league without a reasonable chance to return. Moreover, it is quite likely that especially the more recent changes in the institutional environment, such as the Bosman-ruling [see, inter alia, Simmons, 1997; Antonioni and Cubbin, 2000] had the effect of reducing the length of individual careers because poorly performing players can now be replaced more easily by (cheap) labor from Eastern Europe, Asia, Africa, Australia and possibly even South America.

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There are a number of other changes that may have had an impact on players' careers:

- In the first two seasons (1963/64 and 1964/65) the number of clubs was limited to 16. Before the season 1965/66, the number was increased to 18. In the season 1991/92 the number was further increased to 20 to integrate a number of teams from the former East German Oberliga. After that season, however, the number of teams was again reduced to 18.
- In 1968/69 the number of players that could be substituted during a match was increased from one to two. Since 1995/96 three players may be replaced. Substitutes may either serve the purpose of replacing an injured player or may have tactical reasons.
- In order to punish players for behaving "unfairly" by tackling opposing players too hard, referees may sanction players by showing them a yellow card first and, in case the player repeats his unfair actions, a red card. In the latter case, a player is sent off the field with no substitution being allowed. Red and yellow cards were implemented in 1970/71 and in 1991/92 a combined yellow/red card was introduced. Following a red card a player is—depending on the severity of the foul committed—barred from competition for 3-6 weeks while a yellow/red card implies that a player is excluded for one match. Moreover, if a player has accumulated five yellow cards, he is also excluded from the next match.
- In order to promote offensive play the league in 1995/96 considerably increased the rewards for winning. While until then the winning team received two points (the losing team zero, in case of a tie both teams were and still are awarded one point), winning is now rewarded with three points, i.e., the "prize spread" between winner and loser was increased.
- Finally, in a response to the so-called "Bosman-ruling" the league in 1996/97 increased the number of foreign players allowed per team: Teams may now employ as many foreigners from UEFA countries as they wish and are additionally permitted to have three Non-UEFA players competing simultaneously on the pitch. This latter rule was changed again in 2001/02. Now the number of foreigners from Non-UEFA countries that may be used in a single match is five.

Thus, the aim of our paper is to add to the growing body of literature trying to identify the relative importance of individual, team-specific and "environmental" factors in explaining the players' individual labor market success, i.e., the longevity of their careers (for recent summaries of labor markets in professional team sports see Rosen and Sanderson [2001] as well as Kahn [2000]). Summarizing, then, the purpose of our paper is manifold, because the high quality data we have (it has been produced and is still being used by the league administration) enable us to address several different questions simultaneously:

- First, is there any discrimination with regard to individual career duration? Have non-German players from different parts of the world a higher probability of being cut from the league? Have defensive players—often considered less valuable by managers and less supported by fans—shorter careers than midfielders or forwards?
- Second, to what extent does the team's success affect the career duration of its individual players? Is the risk of being cut especially pronounced for players who are active for teams that have been relegated?
- Finally, do the numerous changes in the institutional environment have any pronounced effect on the individual player's career duration?

To the best of our knowledge, our study is the first one tackling the questions mentioned above for any of the professional team sports leagues in Europe. It takes up several of the questions that have been raised by, inter alia, Hoang and Rascher [1999] and Groothuis and Hill [2004], who studied exit discrimination of black players in the NBA, Ohkusa [2001], who studied the quit behavior of Japanese baseball players, Spurr and Barber [1994], who analyzed the careers and the success probabilities of minor league baseball players, and Atkinson and Tschirhart [1986], who looked at the determinants of career length in the NFL [see also Jiobu, 1988].

Using an individual data set that contains information on every single player who appeared in at least one match in the first German soccer league (the "Bundesliga") since it was established in 1963/64, we estimate failure time models that explain the length of what can be termed a rather risky career. Section 2 offers a description of the data set, section 3 first introduces the estimation methods used and then presents our empirical findings. We conclude with a summary and some implications for further research.

DATA SET AND DESCRIPTIVE STATISTICS

Our empirical investigation is based on a longitudinal data set from the German Bundesliga covering a 40 year period. The dataset has been compiled from various issues of *Kicker*, a wellknown and widely read soccer magazine. Apart from information on individual player characteristics the data set also includes some measures of team performance and of changes in the institutional environment.

The dataset consists of all players employed by any one of the 48 teams in any of the Bundesliga seasons 1963/64-2002/03. While the number of different players is 4,116, the number of different spells amounts to 5,354. This implies that quite a number of players exit the league at some point in time and then return after one or more seasons. The departing players either leave the league voluntarily by signing with a team abroad (in Italy, Spain, England or France for example) or involuntarily because their team is relegated. Summarizing, it appears that most players have rather short careers (see columns 3 and 5, Table 1).

More than one third of all players "disappear" again after their first season and only one career out of twelve lasts for 10 years and more. The fact that very short spells are more frequent than very short careers (46% vs. 34%) is due to the fact that recently promoted teams have a high probability of being relegated again after just one season [Frick and Prinz 2004]. Thus, players who are under contract with one of the promoted teams are more likely than others to disappear again after their first season.[3] Since a number of teams have been oscillating between first and second division for years, many players manage to play first division more than once, but very often for rather short periods of time.

Consequently, some players cannot be observed temporarily and are thus removed from the risk pool for the duration of their absence. In order to account for these temporary exits we use two different dependent variables in our empirical analysis: The term "spell duration" is used to describe a period that is not interrupted by a temporary exit and a subsequent reentry while the term "career duration" refers to the total number of years a player has been active in the Bundesliga. Thus, when analyzing the determinants of spell length we treat "re-entrants" as new players (see column 4, Table 2) while in the case of career length we treat them as "incumbents" (see column 5, Table 2).

TABLE 1
Number of Players Appearing for ... Years in the Bundesliga, 1963/64 - 2002/03

Number of Years	Spell Duration n	Spell Duration %	Career Duration n	Career Duration %
1	2,463	46.00	1,414	34.35
2	1,033	19.29	756	18.37
3	543	10.14	452	10.98
4	346	6.46	333	8.09
5	225	4.20	230	5.59
6	170	3.18	187	4.54
7	132	2.47	161	3.91
8	102	1.91	126	3.06
9	74	1.38	111	2.70
10	77	1.44	86	2.09
11	49	0.92	66	1.60
12	45	0.84	61	1.48
13	26	0.49	31	0.75
14	36	0.67	41	1.00
15	16	0.30	26	0.63
16	9	0.17	15	0.36
17	4	0.07	13	0.32
18	3	0.06	3	0.07
19	1	0.02	3	0.07
22	0	0.00	1	0.02
	5,354	100	4,116	100

Table 2 illustrates this phenomenon by using one of the most prominent players in our database as an example: Lothar Matthäus played nine years for two different teams in the Bundesliga before he left Germany to sign with the Italian top team of Internazionale Milano. He returned to Bayern Munich in 1993 which means that he was temporarily removed from our risk pool. Ignoring his stay in Italy we treat him as a new player in the season he returned to the Bundesliga. The career information of all players that exited and re-entered the league is organized in this manner, irrespective of whether they played for the same team before they left or for another club (see Model I, Table 5 below). However, when analyzing the determinants of career duration we use the aggregated number of years a player has spent in the league irrespective of the number and/or the duration of interruptions (see Models II and III, Table 5 below).

Comparing overall career duration and average spell length is interesting as the means are quite different (4 years vs. 3.4 years; see Table 3). Recall that career duration is defined as the total number of years an individual has been playing in the Bundesliga, ignoring exits and re-entries. Spell duration, on the other hand, only counts the years without any interruption.

Moreover, it appears from Table 3 that players are on average 26 years old and that they have spent 2.7 years with one and the same employer (not necessarily in the first division only; players might have been active for their current team before that team was promoted). The average number of goals scored per season is 2.5, the average number of yellow cards is 1.7 and players are used for 20 matches per season.

MODELS AND RESULTS

In an attempt to analyze the impact player characteristics, player performance and institutional changes might have on the team's decision to retain or cut players we

estimate three Cox proportional hazard models that differ in the dependent variables used (spell duration and two different measures of career duration).

TABLE 2
The Treatment of Player Re-entry in the Bundesliga

Name	Team	Season	Spell Length/Re-Entry	Career Length (temporary exit ignored)	Number of Spell
Matthäus	Gladbach	1980	1	1	1454
Matthäus	Gladbach	1981	2	2	1454
Matthäus	Gladbach	1982	3	3	1454
Matthäus	Gladbach	1983	4	4	1454
Matthäus	Gladbach	1984	5	5	1454
Matthäus	Munich	1985	6	6	1454
Matthäus	Munich	1986	7	7	1454
Matthäus	Munich	1987	8	8	1454
Matthäus	Munich	1988	9	9	1454
Matthäus	Munich	1993	1	10	1455
Matthäus	Munich	1994	2	11	1455
Matthäus	Munich	1995	3	12	1455
Matthäus	Munich	1996	4	13	1455
Matthäus	Munich	1997	5	14	1455
Matthäus	Munich	1998	6	15	1455
Matthäus	Munich	1999	7	16	1455
Matthäus	Munich	2000	8	17	1455

TABLE 3
Summary Statistics

++Spell Length	3.36	2.93	1	19	15,299
Career Length	3.96	3.32	1	22	15,299
Age (AGE)	26.52	4.07	17	44	15,299
Tenure (TEN)	2.67	2.32	1	19	15,299
Games Played per Season (GP)	19.93	10.94	1	38	15,299
Goals per Season (GS)	2.48	3.83	0	40	15,299
Red Cards per Season (RCA)	0.09	0.31	0	3	15,299
Yellow Cards per Season (YCA)	1.75	2.33	0	16	15,299
Goalkeeper (GK)	0.09	-	0	1	15,299
Defender (DEF)	0.32	-	0	1	15,299
Midfielder (MID)	0.31	-	0	1	15,299
Forward (FOR)	0.28	-	0	1	15,299
German (GER)	0.82	-	0	1	15,299
Eastern Europe (EEU)	0.05	-	0	1	15,299
Western Europe (WEU)	0.05	-	0	1	15,299
North America (NAM)	0.00	-	0	1	15,299
South America (SAM)	0.03	-	0	1	15,299
Asia (ASI)	0.01	-	0	1	15,299
Africa (AFR)	0.03	-	0	1	15,299
Australia (AUS)	0.01	-	0	1	15,299
Final League Position (POS)	9.67	5.18	1	20	15,299
League Size 16 (NC16)	0.04	-	0	1	15,299
League Size 18 (NC18)	0.93	-	0	1	15,299
League Size 20 (NC20)	0.03	-	0	1	15,299
3 Foreigners (FOR3)	0.21	-	0	1	15,299
No Restriction (FOR+)	0.11	-	0	1	15,299

Analyzing the effects of the covariates on the hazard function requires a duration model. This is the proportional hazard approach which consists, however, of a wide array of different models. We decided to use Cox's [1972] semi-parametric proportional hazard model. The Cox model is a well recognized statistical technique for analyzing survival data. Moreover, it is the most general regression model developed to investigate survival data, because it does not impose any assumption concerning the nature or the shape of the underlying survival distribution. The model assumes that the underlying hazard rate (rather than the survival time) is a function of the independent variables. The Cox model does not limit the pattern of the hazard rate like parametric models with a Weibull, exponential or log-logistic distribution and it further solves the problem of censored observations [Kiefer, 1988]. In the Cox model the conditional hazard function, given the vector z of covariate values at time t or the corresponding time interval, is assumed to be of the following form:

$$\lambda(t \mid z) = \lambda_0(t)\exp(\beta z),$$

where β is the vector of regression coefficients and $\lambda_0(t)$ denotes the baseline hazard function. The baseline hazard function corresponds to the probability for the respective player of leaving the league either voluntarily or involuntarily (or generally reaching an event) when all the explanatory variables are zero. The baseline hazard function is analogous to the intercept in ordinary regressions (since exp(0) = 1). One additional feature of the model is that exogenous variables can be time-constant variables, but also—and more important—time-varying variables such as performance or age.

The regression coefficients $\hat{\beta}$ (the covariates of interest) give the proportional change that can be expected in the hazard, related to changes in the independent variables. They are estimated by maximizing the partial log-likelihood function:

$$\ln L = \sum_{j=1}^{D}\left\{\sum_{k\in D_j} z_k\beta - d_j \ln\left[\sum_{i\in R_j}\exp(z_i\beta)\right]\right\}$$

where j indexes the ordered failure times t_j, D_j is the set of d_j observations that fail at t_j, and R_j is the set of individuals that are at risk at time t_j. Only event times (leaving the Bundesliga) contribute positively in the first expression to the partial likelihood. In general, the hazard rate is the probability of being eliminated from the league during a specific time interval, conditional on having been in the league until the beginning of that interval.

Summarizing, the hazard concept has clear advantages compared to its potential alternative, a logistic regression. Estimating a logistic regression with a dummy as the dependent variable (distinguishing players that left the Bundesliga from those who survived) does not use all the information available for both groups. Moreover, it cannot incorporate the effect of a player's duration in the state prior to the occurrence of the event. Finally, a logit regression cannot handle in a satisfactory way right-censored cases, i.e., the players for which the event of being fired from the league is not observed within the time period of our analysis (t_4 in our Figure 2 in the appendix).

At the same time, however, we also observe players whose spells are left-censored. These are the individuals who might have started their careers before the Bundesliga was established in 1963/64 (t_5). Unfortunately, we are unable to distinguish between players who started their careers in 1963/64 and those who had already been active in one of the "Oberliga", i.e., those who had already been playing as (semi-)professionals before. However, estimating our model with and without the players with left-censored spells leaves the findings virtually unchanged. This is not surprising, since the overwhelming majority of the players begin and end their careers during the period of observation.

Table 4 provides information on the number of cases available for our empirical analyses; Figures 3 and 4 in the Appendix display the survival and the hazard rate for the population we study.

TABLE 4
The Size of the Player Population (1963/64-2002/03)

Number of Different Players:	4,116
Number of Different Spells:	5,354
Number of Failures:	3,662 / 4,900*
Incomplete Spells:	454
Number of Player-Year-Observations:	15,299

* The first number is for individuals, the second for spells.

Table 5 shows the results of our estimations. The base models display a considerably better fit than the respective null model implying that the accumulated effect of the covariates on the probability of leaving the Bundesliga is not significant can be rejected at all conventional levels of significance. Furthermore, the summary statistics indicate that in absolute terms 4,900 and 3,662 events were observed (players leaving the Bundesliga during the 40 year period under observation). Table 5 includes the results of various Cox models that differ in the dependent variables used. Model I seeks to identify the determinants of spell duration while Models II and III use career duration as the dependent variable (the difference between the latter two models is that we once include the years a player has presumably been active in either division 2 or abroad (Model II) while in the other case we disregard these years (Model III). As expected, the three estimations produce quite similar results.[4]

Perhaps surprisingly, the available performance statistics have a purely linear impact on the duration of individual careers (none of the squared terms proved to be statistically significant): While age has a statistically positive influence on the probability of being eliminated from the Bundesliga (i.e., the hazard ratio has a value of larger than one), the number of games played and the number of goals scored per season both have a statistically negative influence (i.e., the hazard ratio in both cases takes a value of less than one). Depending on the specification, an additional year increases the dropout probability considerably (between 6% and 25%). Scoring one more goal per season reduces a player's probability of being cut from the league by 5-7%.[5] Similarly, playing one more match per season compared to the average player reduces that probability by 5-6%. Moreover, sanctions in the form of yellow or red cards have no influence on the probability of being eliminated.

As expected, all of the position dummies are significant, indicating that defenders, midfielders and forwards have significantly shorter spells and careers than goalkeepers

(the reference category). Perhaps surprisingly, defenders survive considerably longer than midfielders and especially forwards.[6]

TABLE 5
Determinants of Spell and Career Duration in the Bundesliga, 1963/64-2002/03#

Variable	Spell Duration (Model I)		Career Duration (Model II)		Career Duration (Model III)	
	Hazard Ratio	z	Hazard Ratio	z	Hazard Ratio	z
Individual Characteristics						
AGE	1.103	(3.65)***	1.251	(7.07)***	1.063	(1.71)*
AGE2	0.999	(1.48)+	0.998	(3.92)***	1.000	(0.47)+
TEN	1.028	(1.20)+	0.962	(1.94)*	0.997	(0.09)+
TEN2	0.999	(0.68)+	1.004	(2.16)**	1.000	(0.12)+
GP	0.953	(11.89)***	0.941	(8.17)***	0.943	(6.16)***
GP2	1.000	(0.09)+	1.000	(0.09)+	1.000	(0.02)+
GS	0.951	(4.57)***	0.933	(4.57)***	0.935	(3.86)***
GS2	1.001	(0.82)+	1.000	(0.19)+	1.000	(0.15)+
YCA	0.997	(0.46)+	0.986	(1.46)+	0.990	(0.89)+
RCA	0.947	(1.26)+	0.959	(0.77)+	0.946	(0.86)+
Position Dummies						
GK	ref. cat.		ref. cat.		ref. cat.	
DEF	1.091	(2.16)**	1.407	(6.62)***	1.213	(3.05)***
MID	1.164	(3.72)***	1.504	(7.73)***	1.306	(4.16)***
FOR	1.362	(7.52)***	1.848	(11.56)***	1.562	(6.91)***
Region of Origin Dummies						
GER	ref. cat.		ref. cat.		ref. cat.	
EEU	1.086	(1.81)*	1.234	(3.71)***	1.203	(3.29)***
WEU	1.098	(2.33)**	1.263	(4.48)***	1.229	(4.19)***
NAM	1.214	(1.13)+	1.370	(1.12)+	1.402	(1.16)+
SAM	1.047	(0.78)+	1.197	(2.25)**	1.205	(2.51)**
ASI	0.856	(1.46)+	0.990	(0.08)+	0.927	(0.69)+
AFR	1.062	(1.12)+	1.130	(1.77)*	1.140	(1.94)*
AUS	0.782	(1.24)+	0.883	(0.54)+	0.853	(0.68)+
Institutional Characteristics						
NC16	0.769	(4.25)***	0.806	(3.09)***	0.739	(4.38)***
NC18	ref. cat.		ref. cat.		ref. cat.	
NC20	1.066	(1.07)+	0.917	(1.08)+	0.984	(0.19)+
FOR3	0.961	(1.08)+	0.752	(5.75)***	0.835	(3.38)***
FOR+	0.803	(6.71)***	0.768	(6.58)***	0.738	(6.86)***
POS	1.097	(32.14)***	1.085	(24.02)***	1.085	(22.27)***
Observations	15299		15299		9392	
No. of Failures	4900		3662		3662	
LL Null model	-38295.38		-27445.33		-20177.21	
LL Full model	-36879.20		-25893.10		-19199.03	
Wald Chi2	5314.43		5536.00		3528.65	

Standard errors adjusted for clustering on teams
Global test of proportional hazards assumption: 61.33 (Model I); 48.22 (Model II); 52.32 (Model III); none of them statistically significant.
+ not significant; * p < .10; ** p < .05; *** p < .01

Whether players from specific areas of the world are discriminated against with regard to the duration of their individual careers can be seen from the coefficients of the nation dummies employed in our estimation. The positive and statistically signifi-

cant coefficients for Eastern Europeans, Western Europeans and South Americans indicate that players from these regions face a higher risk of being eliminated from the Bundesliga. This, however, is certainly not necessarily indicative of discrimination in the sense that either managers or spectators prefer players of German origin. Rather, especially players from Western Europe and South America may leave the Bundesliga because they sign more lucrative contracts with teams in Spain, Italy, England and France. This explanation, however, does not apply in the case of players from Eastern Europe, who may indeed suffer from discrimination. Kalter [1999], for example, has recently shown that the number of replica shirts sold is significantly influenced by the players' origin: While shirts with the names of players from Eastern Europe do not sell well, those with the names of South American players are bestsellers. Moreover, the poorer the performance of the team (in terms of league position at the end of the season), the higher the individual player's risk of termination (an increase in the final position by one rank increases the probability of being cut by almost 10%).[7]

Most revealing are the coefficients of the variables indicating changes in the institutional environment. When looking at the impact of the Bosman-ruling and the ensuing further liberalization of the player market on individual careers, we find that the respective coefficients are negatively signed (the hazard ratios are smaller than one) and highly significant, indicating that a "liberalized" player market does not reduce, but rather increases the career durations of Bundesliga players. Given the influx of cheap labor especially from Eastern Europe, Africa and Asia this is a surprising finding. A possible explanation for this observation might be that the additional labor supply deters shirking behavior within the incumbent workforce.[8]

Estimating the three models presented in Table 5 with team dummies gives interesting results, too (see Table 6): First, the Cox model is again to be preferred to its alternatives (various parametric models), implying that the proportional hazard assumption is supported by the data. Second, the coefficients of the individual player characteristics remain virtually unchanged (the detailed results are available upon request).

Finally, and most interestingly, the team dummies themselves indicate that even after controlling for the performance of the team it does make a difference for the players for which club they are playing in terms of the duration of their careers: In many cases players who were active for a team that was relegated at the end of the season are not able to sign with another first division club and are, therefore, very likely to disappear in the 2nd or even 3rd division (such as 1. FC Saarbruecken, Borussia Neunkirchen, Preussen Muenster, Fortuna Koeln, SSV Ulm, Darmstadt 98, Stuttgarter Kickers, Tennis Borussia Berlin and VfB Leipzig). On the other hand, there are a number of notable exceptions, i.e., teams whose players have a high chance of being rehired by other first division teams in the case of relegation. Among them are clubs like Dynamo Dresden, Hansa Rostock, Energie Cottbus, SG Wattenscheid 09, Waldhof Mannheim and VfL Bochum.[9] Many of these players managed to stay in the league even in case their former team got relegated.

SUMMARY AND IMPLICATIONS FOR FURTHER RESEARCH

While the findings presented above are conclusive, the potential of our data is by no means exhausted yet. For the 1990s we have additional information on player sala-

TABLE 6
The Impact of Individual Teams on the Duration of Player Careers

Team	Spell Duration (Model I)		Career Duration (Model II)		Career Duration (Model III)	
	Hazard Ratio	z	Hazard Ratio	z	Hazard Ratio	z
1. FC Dynamo Dresden	0.710	(2.80)***	0.892	(0.76)+	0.710	(2.13)**
1. FC Kaiserslautern	0.916	(1.20)+	0.917	(1.01)+	0.819	(2.27)**
1. FC Köln	1.159	(2.12)**	1.171	(1.88)*	1.093	(1.03)+
1. FC Nürnberg	0.915	(1.18)+	0.945	(0.63)+	0.917	(0.92)+
1. FC Saarbrücken	1.392	(3.88)***	1.532	(3.92)***	1.445	(3.03)***
Alemannia Aachen	1.090	(0.83)+	1.280	(1.98)**	1.052	(0.43)+
Arminia Bielefeld	1.086	(1.09)+	0.988	(0.12)+	0.920	(0.75)+
Borussia Dortmund	0.975	(0.35)+	0.960	(0.47)+	0.961	(0.44)+
Bayer 04 Leverkusen	0.800	(2.44)**	0.717	(3.00)***	0.660	(3.40)***
Blau-Weiß 90 Berlin	1.346	(2.06)**	1.386	(1.55)+	1.008	(0.04)+
Bor. Mönchengladbach	0.921	(1.04)+	0.907	(1.05)+	0.874	(1.34)+
Borussia Neunkirchen	1.409	(3.44)***	1.428	(2.77)***	1.247	(1.54)+
Eintracht Frankfurt	1.005	(0.08)+	1.039	(0.49)+	0.996	(0.05)+
FC 08 Homburg	0.990	(0.09)+	1.082	(0.54)+	0.936	(0.33)+
FC Bayern München	1.366	(4.02)***	1.234	(2.24)**	1.157	(1.57)+
FC Energie Cottbus	0.359	(4.15)***	0.415	(3.47)***	0.387	(3.59)***
FC Hansa Rostock	0.815	(1.95)*	0.852	(1.26)+	0.773	(1.80)*
FC Schalke 04	0.892	(1.62)+	0.901	(1.20)+	0.832	(2.01)**
FC St. Pauli Hamburg	1.078	(0.91)+	1.120	(1.13)+	1.094	(0.83)+
Fortuna Düsseldorf	0.953	(0.65)+	1.015	(0.16)+	0.930	(0.74)+
Hamburger SV	ref. team		ref. team		ref. team	
Hannoverscher SV 96	1.021	(0.26)+	0.940	(0.66)+	0.828	(1.85)*
Hertha BSC Berlin	1.171	(2.10)**	1.208	(2.10)**	1.120	(1.22)+
KFC Uerdingen 05	1.048	(0.64)+	1.000	(0.00)+	0.900	(1.06)+
Karlsruher SC	0.949	(0.77)+	1.027	(0.32)+	0.922	(0.96)+
Kickers Offenbach	1.389	(3.45)***	1.075	(0.55)+	0.970	(0.22)+
MSV Duisburg	1.049	(0.66)+	1.113	(1.30)+	0.960	(0.46)+
Preußen Münster	2.519	(4.99)***	2.381	(3.45)***	2.379	(3.52)***
Rot-Weiß Essen	1.123	(1.38)+	1.019	(0.16)+	1.024	(0.21)+
Rot-Weiß Oberhausen	0.822	(1.88)*	0.993	(0.06)+	0.851	(1.23)+
SC Fortuna Köln	2.266	(5.99)***	2.889	(6.44)***	2.273	(4.54)***
SC Freiburg	0.957	(0.47)+	1.103	(0.83)+	1.027	(0.21)+
SG Wattenscheid 09	0.741	(2.71)***	0.963	(0.26)+	0.742	(2.17)**
SSV Ulm 1846	2.110	(5.62)***	2.810	(6.18)***	2.050	(4.19)***
SV Darmstadt 98	1.569	(3.24)***	1.580	(2.59)***	1.201	(0.75)+
SV Waldhof Mannheim	0.795	(2.42)**	0.801	(1.73)*	0.700	(2.84)***
SV Werder Bremen	0.884	(1.70)*	0.849	(1.93)*	0.771	(2.97)***
SpVgg Unterhaching	1.301	(1.92)*	1.483	(2.35)**	1.348	(1.53)+
Stuttgarter Kickers	1.404	(2.85)***	1.649	(3.57)***	1.480	(2.15)**
TSV 1860 München	1.026	(0.33)+	0.999	(0.01)+	0.968	(0.34)+
Eintracht Braunschweig	0.898	(1.31)+	0.889	(1.18)+	0.809	(1.93)*
Tasmania 1900 Berlin	1.133	(1.17)+	1.466	(2.72)***	1.155	(1.09)+
Tennis Borussia Berlin	1.484	(3.55)***	1.201	(0.95)+	1.542	(2.65)***
VfB Leipzig	1.353	(2.16)**	1.587	(2.28)**	1.329	(1.64)+
VfB Stuttgart	0.992	(0.11)+	0.999	(0.01)+	0.882	(1.39)+
VfL Bochum	0.857	(2.15)**	0.776	(2.88)***	0.750	(3.05)***
VfL Wolfsburg	1.041	(0.30)+	1.206	(1.30)+	1.076	(0.47)+
Wuppertaler SV	1.004	(0.03)+	1.177	(1.20)+	1.018	(0.11)+

+ not significant; * $p < .10$; ** $p < .05$; *** $p < .01$

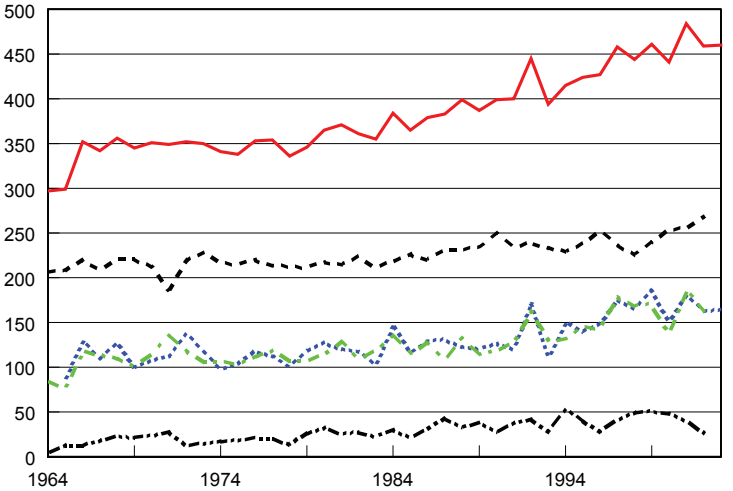
ries, contract duration and more detailed performance statistics (such as international caps[10]). Moreover, we have complete information on transfer fees[11] that have been paid since 1981/82 by the Bundesliga teams. Although that information is available only for a subperiod it will enable us to control for additional (potential) determinants of career duration in a risky environment. Moreover, it is certainly advisable to repeat the estimates for subperiods, such as 1963-1970; 1971-1980; 1981-1990 and 1991-2000) in order to check for the stability of the point estimates over time. Finally, we will certainly try to estimate a competing risk model that takes into consideration the different reasons for leaving the Bundesliga (voluntary vs. involuntary exit, for an application see, inter alia, Dolton and van der Klaauw [1999]).

Moreover, the finding that teams may discriminate against players from Eastern Europe should be subject to further research. The most pertinent question in this context is whether teams pay a penalty for their management's or their supporters' taste for discrimination (for empirical evidence on this point see, for example, Szymanski [2000]). Another promising direction for further research is estimating a time-series model (see Schmidt and Berri [2002]) that allows identifying the impact of changes in the institutional environment on average career duration.

In principle the data allows testing Rottenberg's [1956] invariance hypothesis as well as Daly and Moore's [1981] transactions cost approach. In case the invariance hypothesis holds we should observe that player mobility is unaffected by changes in the legal environment, such as the "Bosman ruling" of the European Court of Justice in December 1995. If, however, transactions costs are reduced by restricting player mobility, then "excess mobility" detrimental to the value of the league may be the consequence of such a "liberal" regime.[12]

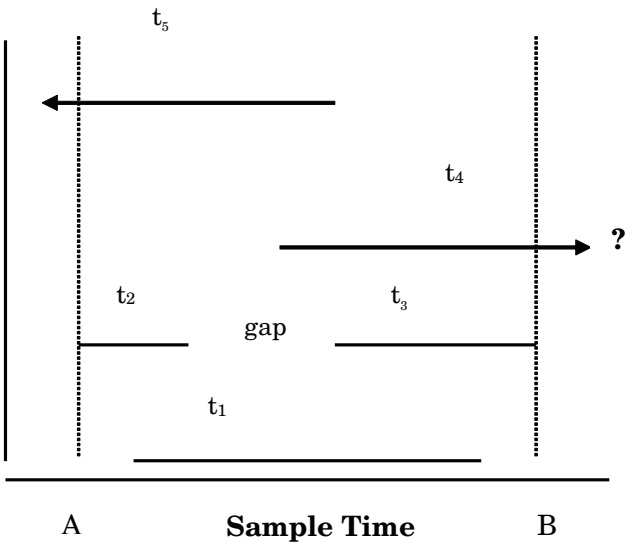
APPENDIX

FIGURE 1
Labor Market Dynamics in the German Bundesliga (1963/64-2002/03)



first line: all players
second line: stayer (players remaining with their team)
third line: entrants (new players)
fourth line: drop-outs (players leaving Bundesliga)
fifth line: mover (players changing teams within Bundesliga)

FIGURE 2
Spells and Censoring



A: Start of observation period (season 1963/64)
B: End of observation period (season 2002/03)
t1: Completed Spell
t2, t3: Intermediate exit with subsequent reentry
t4: Right-censored spell (no information on players after 2002/2003
t5: Left-censored spell (no information on players before 1963/64)

FIGURE 3
Survivor Rate of Professional Soccer Players in the German Bundesliga, 1963/64-2002/03

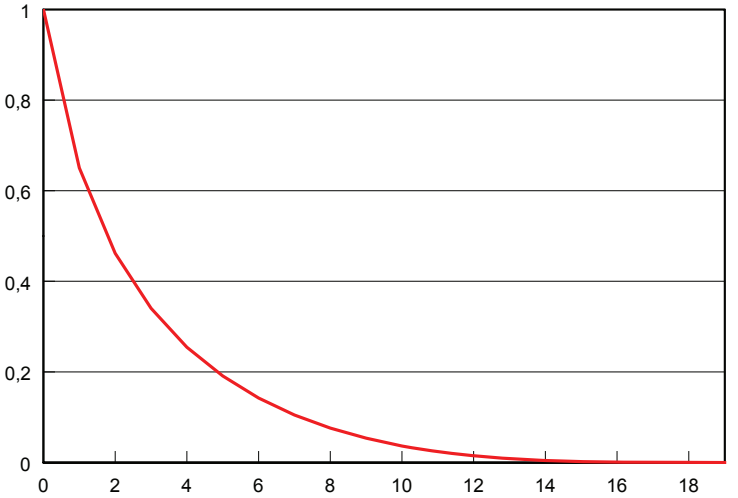
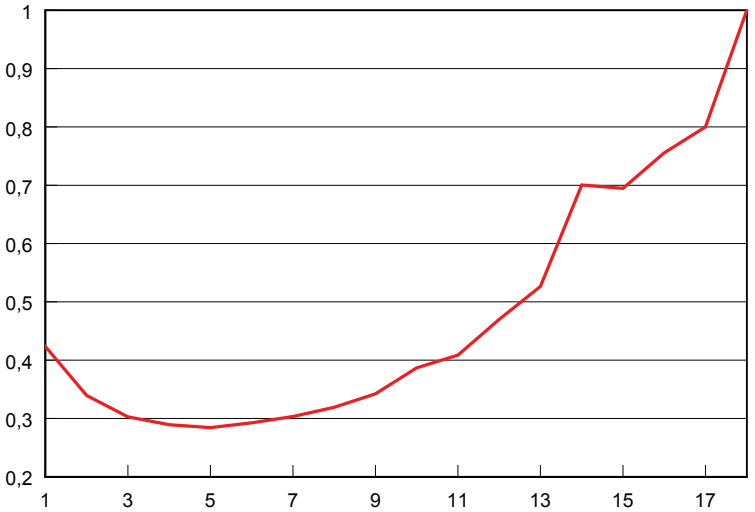


FIGURE 4
Hazard Rate of Professional Soccer Players in the German Bundesliga, 1963/64-2002/03



NOTES

1. See, for example, Franck [1995]; Erning [2000]; Kipker [2001]; Swieter [2002]; Ziebs [2002] and Klaffke [2003].
2. "Relegation" in the German context means that at the end of each season the three weakest teams are demoted to the second division and replaced by the three best-performing teams from that second division. For an economic analysis of the promotion and relegation system in the English football league, see Noll [2002].
3. Figure 1 in the appendix displays the annual number of stayer, mover, entrants and dropouts.
4. We also added a linear time trend to our estimations. The coefficient was insignificant in all specifications, leaving the other variables unaffected (this is probably due to multicollinearity). The results of these extended estimations are available upon request.
5. Goals are not only scored by forwards, but also by defenders and midfielders (some of the latter are quite "offensive"). Moreover, some goalkeepers take virtually every penalty kick for their team and are, therefore, also scoring goals. Interacting the number of goals scored with the position dummies leaves the basic findings virtually unaffected.
6. This may be due to the fact that the performance of forwards is relatively easy to measure, i.e., "number of goals scored" is an obvious metric while "number of tackles won" as the main performance measure for defenders is certainly more difficult to quantify.
7. Additional measures, such as the number of tickets sold per season or capacity utilization of the stadium, proved to be insignificant.
8. Feess, Frick and Muehlheusser [2004] find that shirking is quite prevalent in German soccer, because player performance seems to improve as players reach the end of their contracts.
9. It may well be that these clubs have a particularly well developed youth training and scouting system, producing players who can succeed almost everywhere.
10. This term denotes a player's appearances in his home country's national team.
11. By that we mean the amount of money that is being paid to a team that "sells" a player to another club before that player's contract has expired.
12. We are grateful to one of the referees for pointing this out.

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