

Competitive Balance and Assortative Matching in the German Bundesliga

Roman Sittl ¹ Arne Jonas Warnke ²
Seminar in Labour and Welfare Economics

¹University of Mannheim

²ZEW Mannheim

28 June 2016

Outline

- 1 Competitive Balance: Theory and Empirics
- 2 Measure of Team and Player Performance
- 3 Assortative Matching and the Distribution of Talent Across Teams

Outline

- 1 Competitive Balance: Theory and Empirics
- 2 Measure of Team and Player Performance
- 3 Assortative Matching and the Distribution of Talent Across Teams

Distribution of Playing Talent and Competitive Balance (CB)

① Features of a Balanced Competition

- ▶ Exciting and unpredictable competition (*uncertainty of outcome*)
- ▶ Team sports is unique due to demand-side externalities (fan interest)

② European Soccer Clubs as Win/Utility Maximizers

- ▶ Sloane (1971): "The football club as an utility maximizer"
Hence a given team may have incentives to continue increasing its playing strength vis-à-vis its competitors, generating attendances for itself without taking account of any external costs of reduced attendances elsewhere, due to lessened uncertainty of outcome.

→ Balanced competition is not reached endogenously

Can we observe trends in sorting of players to teams?

Distribution of Playing Talent and Competitive Balance

① Empirical Literature (Bundesliga): Ambiguous Results

- ▶ No changes: Feddersen, 2006 & Goossens, 2005
- ▶ Decreasing competitive balance: Breuer, Hovemann and Pawlowski, 2010 & Lee and Jang, 2015
- ▶ Reliance on aggregated data of end-of-season tables

② Our Approach

- ▶ "Competitive balance in a sports league [...] depends primarily on the distribution of playing talent among teams" Kesenne, 2000
- ▶ Measure of unequal distribution of talent : Correlation between player performance and team strength for each season
 - ★ Effects of managers on firm performance (Bertrand & Schoar, 2003)
 - ★ Measure of inequality: Drivers of wage inequality (Card et al. 2013)

Increasing correlation/assortativity: Decreasing CB

③ Our Contribution

- ▶ New and simple measure of performance in football
- ▶ Analysis of a direct channel of competitive balance

Outline

- 1 Competitive Balance: Theory and Empirics
- 2 Measure of Team and Player Performance
- 3 Assortative Matching and the Distribution of Talent Across Teams

How do we measure player/team performance?

How important is a player for team success?

The Plus/Minus Metrics/Statistics

- Objective player rating mainly used in Ice-Hockey and Basketball
- Based on the team's goal differential when a player is on the pitch
- Parsimonious approach
- Gives us estimates of player, coach and team performance

Data Set

- Period: 1997/98-2015/16
- Matches: 12,133
- Source: kicker.de
- Leagues: 1./2. Bundesliga + DFB-Pokal

	Sample All	Sample 50+
No. of Players	5,072	2,140
No. of Movers (more than one team)	1,999	1,513
Share of Movers	0.39	0.71
No. of Teams		73
No. of Coaches		364
No. of Coaches (>17 matches)		215

Empirical Framework

$$\text{Goal_Difference}_{it} = \gamma_i + \lambda_{J(i,t)} + \varphi_{G(i,t)} + x'_{it}\beta + \epsilon_{it} \quad (1)$$

- γ_i : Player Effect
- λ_j : Team Effect ($J(i,t) = j$ if i plays for team j on match day t)
- φ_k : Coach Effect ($G(i,t) = k$ if k coaches i on match day t)
- $x'_{it}\beta$: Home Advantage, Opponent, Leagues, Age, Age^2 , Dismissals
...

Weighted Least Squares: Player observations are weighted by the fraction of minutes played in each match

⇒ Allows for systematic mobility of better players to better coaches / teams related to γ or λ .

Empirical Framework - Example

Bayern Munich - FC Augsburg 0:1 **32nd match day 2014/15**

Goal for Augsburg: 71st minute

Goal Difference	0	-1	1
Player	Lahm	Lewandowski	Baba
Team	Bayern Munich	Bayern Munich	FC Augsburg
Coach	Guardiola	Guardiola	Weinzierl
Opponent	FC Augsburg	FC Augsburg	Bayern Munich
Home	YES	YES	NO
Season	2014/15	2014/15	2014/15
Age	31	26	20
Minute Out	14	74	91
Fraction	0.15	0.81	1

...

Interpretation of Player and Team Effects

Table: Percentile Differences, Top Players and Relative Importance

%ile Diff	Corresponding Goal Margin			Selected Top Players		
	Team	Player	Coach	Player	Std. Player FE	%ile
90th - 10th	1.26	0.81	0.92	Matthäus	+2.33 SD	99th
75th - 50th	0.32	0.23	0.21	Lewandowski	+1.92 SD	98th
50th - 25th	0.37	0.20	0.22	Alaba	+1.52 SD	95th
# Estimates	74	2140	214	Lehmann	+1.48 SD	94th

Variance Decomposition

	Variance
$SD(\text{Goal_Difference}_{it})$	1.64
$SD(\gamma_i)$ (Player Effect)	0.22
$SD(\lambda_{J(i,t)})$ (Team Effect)	0.53
$SD(\varphi_{G(i,t)})$ (Coach Effect)	0.38
$SD(\epsilon_{i,t})$ (Error Component)	1.49

Note: Sample50+ (Players with more than 50 matches)

Validity of Team and Coach Effects

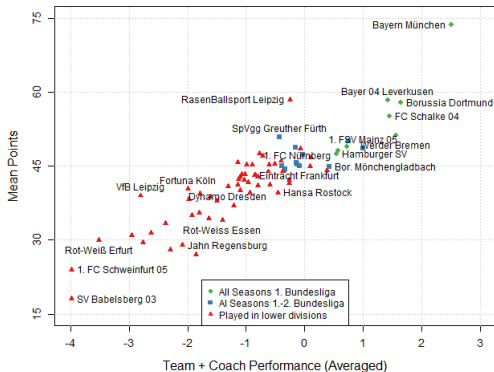
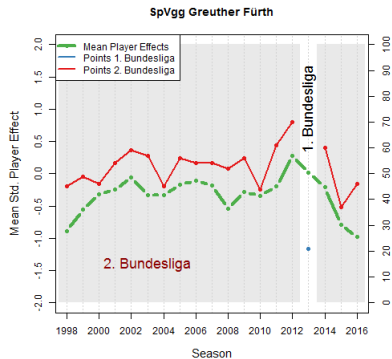
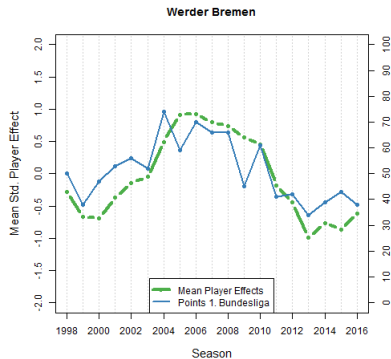


Figure: Relation Average Points and Team+Coach FE

Mean Player Effects Over Time: Two Examples



Outline

- 1 Competitive Balance: Theory and Empirics
- 2 Measure of Team and Player Performance
- 3 Assortative Matching and the Distribution of Talent Across Teams**

Covariance Analysis and Assortative Matching

- Declining competitive balance characterized by rising assortativeness of players to teams
- Assortativeness is measured by correlation between team and player effects each season

$$Cor_x = Cor(\bar{\gamma}_{j,T}, \lambda_j + \bar{\varphi}_{j,T})$$

- Cor_x : Correlation in season $x = 1998, 1999, \dots, 2014, 2016$
- λ_j : Team Effect for Team j
- $\bar{\varphi}_{j,T}$: Mean Coach Effect Team j in Season T
- $\bar{\gamma}_{j,T}$: Mean Player Effect Team j in Season T

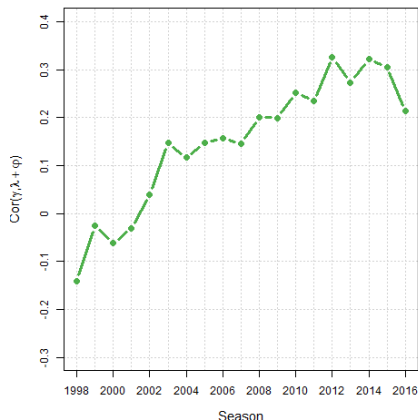
Causes of Increased Assortative Matching

Using the law of total (co)variance, we decompose the total covariance into within and between group components:

$$\text{cov}(X, Y) = \underbrace{E(\text{cov}(X, Y | Z))}_{\text{Within Divisions}} + \underbrace{\text{cov}(E(X | Z), E(Y | Z))}_{\text{Between Divisions}}$$

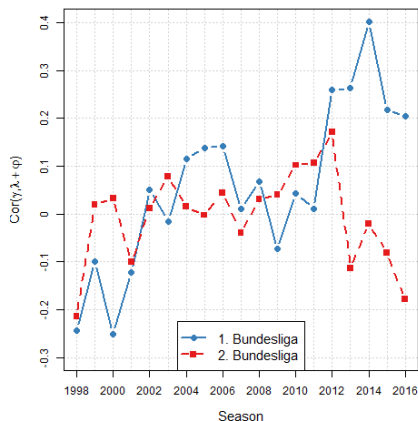
Trends in Assortativeness of Players to Teams

Playing talent is increasingly unequally distributed in the 1. and 2. Bundesliga, i.e. across divisions:



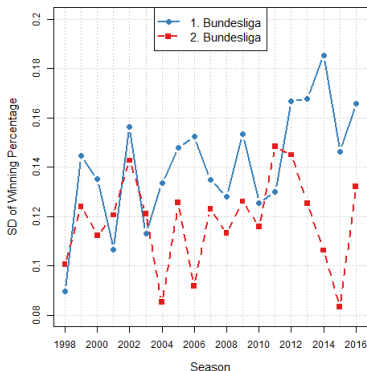
Inequality within Divisions $\text{cov}(X, Y) = E(\text{cov}(X, Y | Z))$

We find this pattern across divisions and within the 1. Bundesliga but not within the second division:



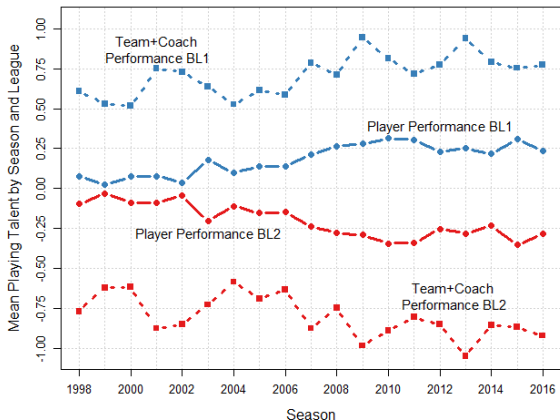
Standard Measures of Competitive Balance

Results are in line with (aggregated) standard measures of competitive balance used in the literature (standard deviation of winning percentage):



Inequality Between Divisions $\text{cov}(E(X | Z), E(Y | Z))$:

Between-division differences have increased:

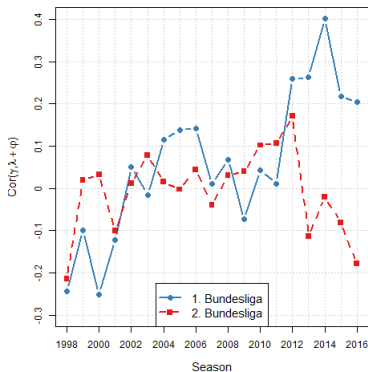
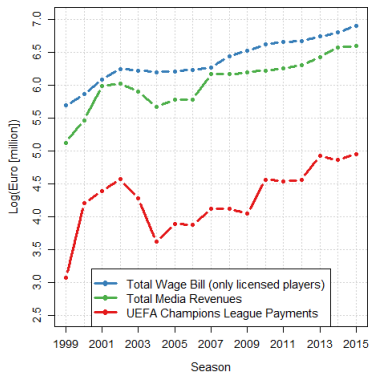


Financial Developments

- Decreasing/Constant Media Revenues from 2001-2006
- Increasing Media Revenues/Wage Bill since 2006

→ Corresponding Development to our CB-Measure

→ Corresponding Development to European Success of German Teams



Summary and Conclusion

Summary

- Valid Measure of Player, Team and Coach Performance
- Inequality within 1. Bundesliga and between first two divisions
- 2. Bundesliga has lost ground
- Probably linked to financial developments
- Increasingly driven by retention of players or transfers from abroad