

Extended Ordered Paired Comparison Models – An Application to the Data from Bundesliga Season 2013/14

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In the following, we present an application of penalized ordered paired comparison models to data from the Bundesliga season 2013/2014. The methods originally were proposed in [Tutz and Schauberger \(2014\)](#) where they were applied to the data from the Bundesliga season 2012/2013. For details on the methods and the models and for the results for the previous season see [Tutz and Schauberger \(2014\)](#).

1 Ranks and Abilities

Table 1 shows the final ranking of the German Bundesliga in the season 2013/14. As in the previous season, Bayern München won the championship. The table shows the points each team won in total and separated between points won at home and away. The abilities are estimated by an (unpenalized) model with a global home advantage. It can be seen that the abilities would result in a slightly different ranking than the points. For example, according to the estimated abilities Stuttgart would perform much better than according to their points, for Werder Bremen we see the contrary effect.

	Points	Home	Away	Ability	QSE	Rank
FC Bayern München	90	46	44	2.541	0.366	1
Borussia Dortmund	71	35	36	1.360	0.311	2
FC Schalke 04	64	38	26	1.313	0.310	3
SV Bayer 04 Leverkusen	61	33	28	1.104	0.305	4
VfL Wolfsburg	60	36	24	1.051	0.305	5
Borussia Mönchengladbach	55	36	19	0.927	0.303	6
FSV Mainz 05	53	33	20	0.455	0.300	9
FC Augsburg 1907	52	30	22	0.568	0.300	8
1899 Hoffenheim	44	27	17	0.613	0.300	7
Hannover 96	42	29	13	0.013	0.304	13
Hertha BSC Berlin	41	21	20	0.232	0.301	10
Werder Bremen	39	24	15	0.000	0.304	15
Eintracht Frankfurt	36	20	16	0.122	0.302	11
Sport-Club Freiburg	36	22	14	0.012	0.304	14
VfB Stuttgart	32	19	13	0.092	0.303	12
Hamburger SV	27	18	9	-0.472	0.313	16
1. FC Nürnberg	26	14	12	-0.498	0.314	17
Eintracht Braunschweig	25	18	7	-0.512	0.315	18

Table 1: Final ranking of the German Bundesliga 2013/2014 including points in home matches and away matches; the last three columns show the estimated abilities, quasi standard errors and the ranking corresponding to the estimated abilities for the ordered model including a home advantage parameter

2 Team-specific Home Effects

For the abilities in Table 2, a model with team-specific home advantages (or home effects, few teams actually have a home disadvantage) is fitted. Hertha BSC Berlin, for example, has a considerably higher ability in matches away than at home. Nevertheless, even Hertha BSC Berlin, won one point more in home matches than in away matches (see Table 1).

	Overall		Home		Away	
	Ability	Rank	Ability	Rank	Ability	Rank
FC Bayern München	2.541	1	2.522	1	2.968	1
Borussia Dortmund	1.360	2	1.248	7	1.871	2
FC Schalke 04	1.313	3	2.171	2	0.965	4
SV Bayer 04 Leverkusen	1.104	4	1.439	5	1.179	3
VfL Wolfsburg	1.051	5	1.734	4	0.809	5
Borussia Mönchengladbach	0.927	6	1.814	3	0.384	9
FSV Mainz 05	0.455	9	1.253	6	-0.112	14
FC Augsburg 1907	0.568	8	0.836	9	0.556	7
1899 Hoffenheim	0.613	7	1.189	8	0.416	8
Hannover 96	0.013	13	0.815	10	-0.525	17
Hertha BSC Berlin	0.232	10	0.140	16	0.637	6
Werder Bremen	0.000	15	0.260	14	0.000	13
Eintracht Frankfurt	0.122	11	0.396	11	0.235	10
Sport-Club Freiburg	0.012	14	0.292	13	0.088	12
VfB Stuttgart	0.092	12	0.393	12	0.172	11
Hamburger SV	-0.472	16	-0.332	17	-0.332	16
1. FC Nürnberg	-0.498	17	-0.571	18	-0.198	15
Eintracht Braunschweig	-0.512	18	0.174	15	-1.023	18

Table 2: Comparison of the estimated abilities from the model with a global home advantage to the estimated abilities from the model with team-specific home advantages

3 Identification of Clusters

Figure 1 shows the coefficient paths for the abilities of the single teams in the model with a global home advantage. The abilities (or rather the differences between the abilities) are penalized with an L_1 -penalty and, therefore, shrunk towards zero. This enforces clusters within the teams where a cluster entails teams with similar abilities.

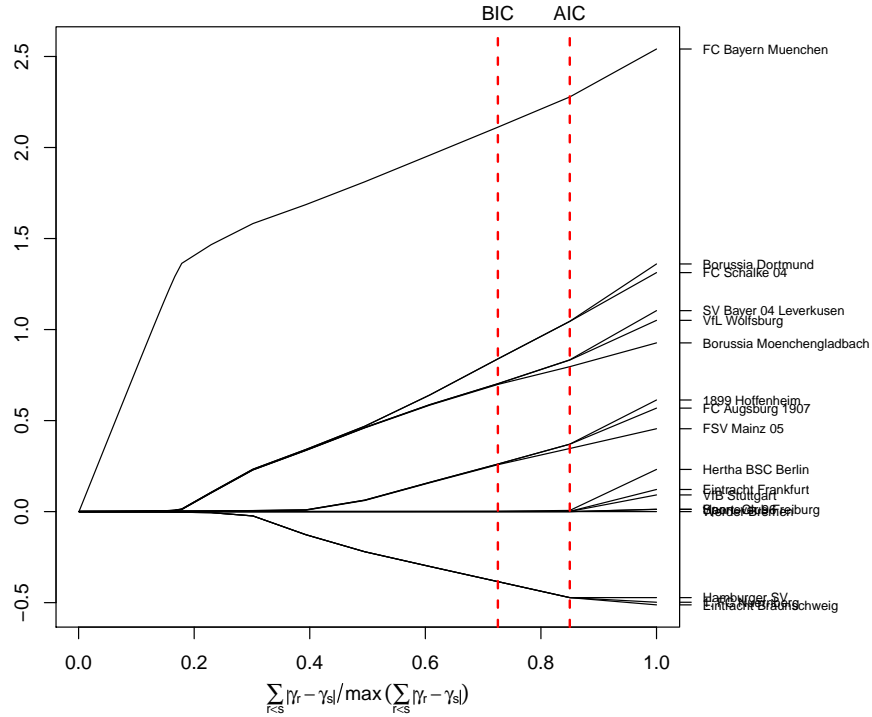


Figure 1: Coefficient paths for ability parameters in the model with a global home advantage using an adaptive L_1 -penalty.

Table 3 shows the resulting clusters if the optimal path point in Figure 1 is chosen by BIC. In total we end up with 6 clusters. The first cluster is the champion Bayern München, seemingly playing in a league of its own. The last cluster entails the two relegated teams Braunschweig and Nürnberg as well as the Hamburger SV, who had to play relegation matches to stay up in the Bundesliga.

Cluster	Ability
1 FC Bayern München	2.11
2 Borussia Dortmund; FC Schalke 04	0.84
3 Borussia Mönchengladbach; Bayer 04 Leverkusen; VfL Wolfsburg	0.70
4 1. FSV Mainz; FC Augsburg; 1899 Hoffenheim;	0.26
5 Sport-Club Freiburg; Eintracht Frankfurt; Hannover 96; Hertha BSC Berlin VfB Stuttgart; SV Werder Bremen	0.00
6 1. FC Nürnberg; Eintracht Braunschweig; Hamburger SV	-0.38

Table 3: Clusters of teams with corresponding abilities.

4 Accounting for Explanatory Variables

In the following, the budget of the teams is accounted for in two different manners.

In Figure 2, the budget (in millions) of the teams are plotted against the respective estimated abilities. The solid line represents the LS estimator of the respective linear model ($R^2 = 0.69$). In contrast to the data from 2012/13, the correlation is clearly linear, the fit of an additive model resulted in a linear model. The plot shows that the abilities of a team highly depend on the budget of the respective club.

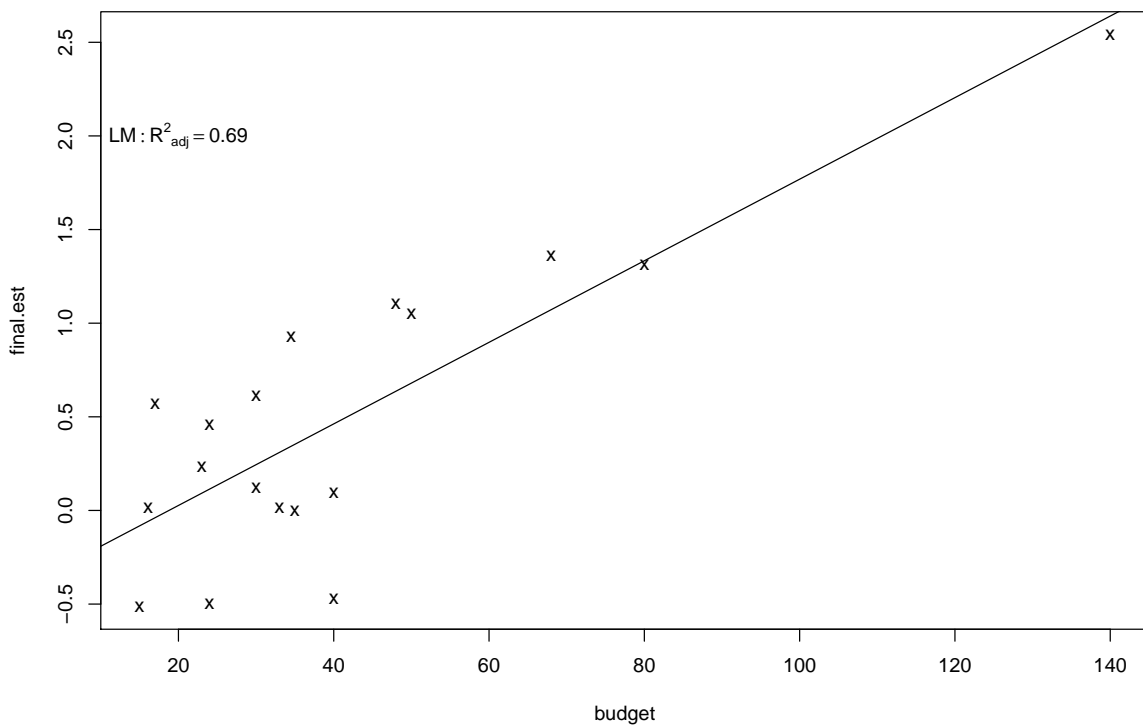


Figure 2: Budgets (in millions) versus estimated abilities for all teams from the Bundesliga season 2013/2014

Figure 3 shows the coefficient paths for the ability parameters if the budget is incorporated in the model (and a global home effect). Again, this results in clusters of team with similar abilities. In this case, the abilities are interpreted as the abilities if the budget is already eliminated by the model. Again, if the optimal path point is chosen by BIC 6 clusters are found. Considering the budget, the Hamburger SV had the worst performance of all teams.

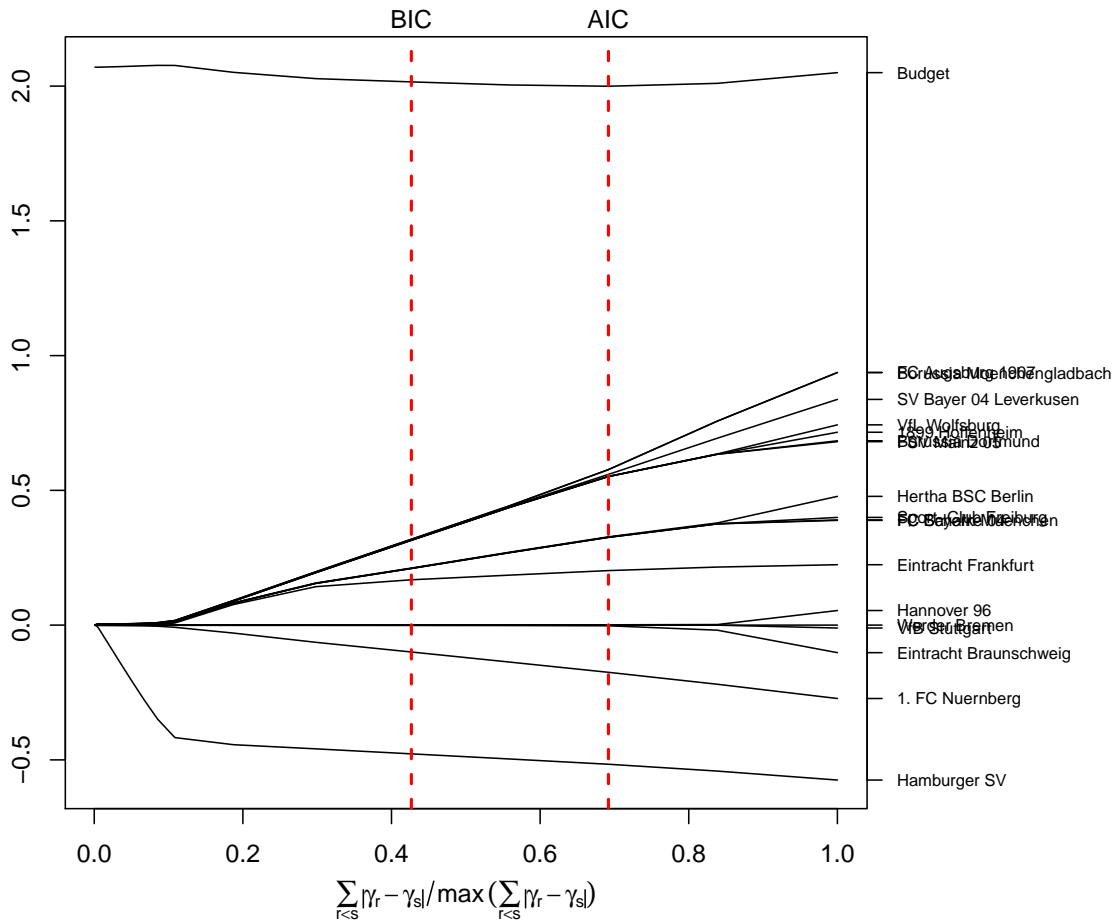


Figure 3: Coefficient paths for ability parameters in the model with a global home advantage and the budget (in 100 millions) using an adaptive L_1 -penalty

References

Tutz, G. and G. Schauberger (2014). Extended ordered paired comparison models with application to football data from german Bundesliga. Technical Report 151, Department of Statistics LMU Munich.