The Incentive Effects of Leveling the Playing Field – An Empirical Analysis of Amateur Golf Tournaments [*]

Jörg Franke[1]
TU Dortmund

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Abstract

Leveling the playing field is an important policy instrument to guarantee an equitable competition among heterogeneous individuals. However, the incentive effects of those policies are usually not explicitly addressed in empirical studies. In this paper the performance in amateur golf tournaments is analyzed to gain insights into the incentive effect of those types of policies. The suggested approach takes advantage of the fact that tournaments in amateur golf are of two distinctive types that apply different scoring rules: The first scoring rule is based on gross scores, i.e. the total number of strokes of a player, while the second scoring rule is based on net scores where the number of strokes is normalized with respect to the respective player's handicap. The empirical analysis is based on performance comparisons of those players that participated in both types of tournaments and suggests that leveling the playing field, as in tournaments based on net score, has positive and significant performance effects.

Keywords: Level playing field, tournament, incentives, amateur golf

JEL classification: C23, D78, L83, M52

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[1] Jörg Franke, Department of Economics and Social Science, TU Dortmund, 44227 Dortmund, Germany. Tel.: (+49) 231 755 3246. E-mail: joerg.franke@tu-dortmund.de.

1. Introduction

Competitive social situations are frequently interpreted as contests or tournaments where individuals compete for fixed prizes by exerting effort. By now there exists an extensive theoretical literature that explicitly addresses the incentive structure that is created in such situations, see the relevant sections in Konrad (2009) for contests, and Lazear (1995) for tournaments. Theoretical predictions from this literature also proved to have predictive power as shown in a number of empirical studies, especially in the area of labor compensation, see Prendergast (1999) for a survey, sports tournaments, but also in laboratory experiments.

As the winner of a tournament is determined based on relative performance, the heterogeneity of the players' field will be an important determinant of individual performance. Theoretical studies predict (in line with common intuition) that increased heterogeneity among players reduces the competitive pressure and consequently also the incentive structure that is present in such situations. Hence, the implementation of policies that level the playing field (by favoring weak players or handicapping strong players) should result in enhanced performance.[2] This theoretical prediction has important policy implications in contexts where those types of policies are in fact implemented, for instance affirmative action programs, promotion tournaments within firms, public procurement auctions, etc.

However, empirical studies that explicitly address the incentive effects of heterogeneity are relatively scarce due to lack of available data or problems of performance measurement.[3] A recent exception is Brown (2009) where the empirical analysis of PGA golf tournaments reveals the discouraging effects of a participating superstar (which indicates a more heterogeneous playing field): Performance of professional golf players is significantly lower in tournaments where Tiger Woods participates in comparison to tournaments where Tiger Woods is absent.

In the subsequent text an empirical analysis of amateur golf tournaments is presented to address the question whether a **systematic leveling of the playing field** has performance

[2] The underlying intuition is confirmed by several theoretical studies based on different set ups, see for instance Lazear and Rosen (1981) for rank-order tournaments and the related experimental study in Schotter and Weigelt (1992) as well as Calsamiglia et al. (2009), the theoretical literature on auctions in Myerson (1981) and McAfee and McMillan, rent-seeking contests in Tullock (1980), Stein (2002), Dasgupta and Nti (1998), and all-pay auctions in Fu (2006). Most of this literature is based on a two-player framework, compare Franke (2009) for a multi-player contest game.

[3] Individual effort in real life tournaments is frequently not directly observable. Sunde (2009) analyzes this case in professional tennis tournaments and shows that even in this context there are significantly adverse incentive effects of heterogeneity.

enhancing effects.[4] Amateur golf is especially suited for this kind of analysis because there are two distinctive types of tournaments in amateur golf that apply different scoring rules to determine the winner of the respective tournament:

1. Tournaments based on the **gross score**, i.e. the total number of strokes that a player needs to finish all the holes of the respective golf course.
2. Tournaments based on the **net score** where the total number of strokes of a player is normalized by taking into account the respective "handicap" of a player (an average measure of its past performance).

As the net score takes into account the past performance of the respective players, weak players can compete against strong players on an equal footing. Hence, in tournaments based on net score the playing field can be considered as being fully balanced.[5] This unique feature of amateur golf tournaments makes it possible to identify the incentive effects of leveling the playing field on an individual level. The fact that players participate in both types of tournaments implies that the incentive effects of leveling the playing field can be derived by comparing individual performance under the two scoring rules. Hence, the empirical strategy is based on a within-subject design using panel data methods. The inclusion of additional information on tournaments, player characteristics, etc., guarantees control over other player or tournament specific factors that might affect performance.

The empirical analysis of golf tournaments has a number of additional advantages, for instance, data availability and a convenient measure of individual effort (i.e. total number of strokes). Therefore, there exist some empirical studies that use data from professional golf tournaments to verify different theoretical predictions from the tournament literature: Ehrenberg and Bognanno (1990a, 1990b) verify the incentive enhancing effects of larger tournament prizes, Pope and Schweitzer (2010) find evidence for loss aversion of golf players, while Guryan et al. (2009) show that there is no evidence for direct peer effects among tournament participants. However, an analysis of systematically leveling the playing field as it is applied in amateur golf tournaments has not been carried out so far.

The rest of the paper is structured as follows: In section 2 the two different tournament types in amateur golf and the respective scoring rules are discussed. Section 3 contains a description of the data set. The empirical analysis is carried out in section 4, while section 5

[4] In this sense the presented approach should be considered as complimentary to Brown (2009).

[5] A quotation from the United States Golf Association (USGA) Handicap Manual 2008 is illustrative: "The purpose of the USGA Handicap System is to make the game of golf more enjoyable by enabling players of differing abilities to compete on an equitable basis."

concludes. A description of the used explanatory variables, as well as alternative econometric specifications are provided in the Appendix.

2. Amateur Golf Tournaments

In amateur golf tournaments are of two different types that are distinct with respect to the type of scoring rule that is applied. The first tournament type, in the following called 'gross tournament', is based on the total number of strokes (gross score) that a player scores at all the holes of the respective tournament course. The respective winner of a gross tournament is that player with the lowest gross score; hence, absolute performance is the decisive measure in this type of tournament. The scoring rule based on gross score is generally applied in professional golf tournaments but also in some amateur tournaments.

In the second type of tournament, in the following called 'net tournament', the scoring rule is not only based on the gross score but also takes into account the individual 'handicap' (a proxy for the player's individual skill or ability)[6] of the respective player. This is achieved by constructing for each tournament an individually adjusted comparison measure, the so called 'playing or course handicap'[7] which is based on the individual handicap of a player in combination with a measure of the difficulty of the respective golf course. Hence, players with different skills might have different playing handicaps at the same hole. The net score of a player is obtained by comparing the number of strokes that a player obtains at a specific hole with the individual playing handicap for that hole. Negative differences indicate better relative performance (in comparison to the individual handicap) and are rewarded with so called Stableford points on a hole by hole-basis. The Stableford points obtained at each hole along the tournament course are then summed up to yield the final Stableford score of a player. The winner of a net tournament is that player with the highest Stableford score, i.e. the player with the highest relative performance. Hence, the playing field in net tournaments can be interpreted as being perfectly balanced because different ability or skill levels of the players are balanced through the inclusion of the individual handicap into the Stableford scoring rule.

[6] For details on the handicap system in Continental Europe see the European Golf Association (EGA) Handicap System Manual, available at the EGA homepage http://www.ega-golf.ch. For the slightly different handicap system used in the US see the USGA Handicap Manual 2008, available at http://www.usga.org.

[7] The playing handicap for a specific player is calculated based on the typically obtained score of a professional player (with handicap zero) at the respective course, called PAR, corrected by the individual handicap of the respective player, as well as some course specific characteristics, i.e. slope rate SR and course rate CR, see Appendix 1 and the EGA Handicap System 2007, p. 14 for details.

The Stableford score is the decisive measure for net tournaments. However, also for gross tournaments it is automatically calculated because the player's golf club is responsible for the provision of the actual updated handicap of its members. Handicap updating is carried out after each tournament participation based on the obtained Stableford score. Hence, the golf club has information on the individual performance of its members expressed as Stableford score for each tournament (irrespective of the applied scoring rule) in which the respective player participated. This facilitates the individual comparison between net and gross tournaments as the Stableford score is a convenient and normalized performance measure that is available for both types of tournaments. If leveling the playing field has incentive enhancing effects then the Stableford score obtained in net tournaments should be significantly higher than in gross tournaments.

Besides the different scoring rules there exists another difference between professional and amateur golf: Monetary prizes are generally prohibited in amateur golf.[8] Hence, the motivation of amateur players to participate in tournaments must be based on non-monetary incentives. In other words the prestige of winning an amateur tournament is sufficiently important such that monetary incentives are substituted by intrinsic motivation or by non-monetary rewards.[9] Additionally, even in professional golf tournaments where monetary prizes are substantive, the empirical results regarding incentive effects of monetary prizes are rather mixed.[10] Hence, the empirical analysis of amateur tournaments is not plagued by the ambiguous role of monetary incentives and can be focused instead on non-monetary incentive effects of leveling the playing field.

3. The data

The data set consists of tournament results of 98 players from the same golf club that participated in 244 tournaments in a period of five month in 2008. All players participated in both types of tournaments, i.e. net and gross tournaments, such that the data set has a panel

[8] The rules on amateur golf are very explicit with respect to accepting prizes of monetary or material value: An amateur golf player that accepts such a prize will immediately loose her/his amateur status which implies that she or he is excluded from participation in any amateur golf tournament.

[9] The roles and implications of non-monetary incentives have been extensively analyzed in several experimental studies, see Fehr and Falk (2002) for a survey.

[10] While Ehrenberg and Bognanno (1990a) derive significantly positive incentive effects of larger prizes, this result is questioned by Orszag (1994). He does not find significant effects of the total prize sum which is also confirmed by Brown (2009).

structure with, in total, 1253 observations.[11] For each player and each tournament an observation consists of the following information:[12] SCORE, the Stableford score of the player, the TYPE (gross or net) of the tournament, HANDICAP, a measure for ability or skill of a player, and a vector of other tournament specific characteristics (i.e. LOC, TIME, PAR, SR, and CR). Additionally, the gender (FEMALE) and the age group (AGE) can be inferred for each player, as well as the average handicap (AVGHANDICAP) of all the players that participated in a respective tournament and on which information is available, i.e. that belong to the 98 players mentioned above.

4. Empirical Analysis

Based on the theoretical literature mentioned above, tournaments with a leveled playing field should induce higher competitive pressure and therefore increased performance by the participating players. Hence, theoretical results predict that the performance of players that compete in net tournaments should be significantly higher than of the same players competing in gross tournaments. The Stableford score is a convenient measure for the performance of a player taking into account the individual handicap. A direct comparison between gross and net tournaments based on this measure reveals that players in net tournaments obtain on average 30.87 Stableford points compared to 30.31 Stableford points in gross tournaments. This significant difference of 0.55 Stableford points (p-value of 0.071 for a two-sided t-test and 0.078 for a two-sided non-parametric Mann-Whitney test) suggests that leveling the playing field does in fact spur competitive pressure and hence performance. The subsequent regression analysis complements this result by controlling for player and tournament specific characteristics as well as other unobserved heterogeneity among players or tournaments. The following final-score equation is estimated, based on the specification introduced in Ehrenberg and Bognanno (1990a), where additionally the variable of interest, *TYPE*, is included:

$$SCORE_{ijt} = \alpha_0 + \alpha_1 TYPE_j + \alpha_2 X_i + \alpha_3 Y_j + \alpha_4 Z_t + \nu_{ijt}$$

[11] As different players participate in different tournaments, there might be a self-selection of players according to the type (gross or net) of the tournament. However, the considered pool of players consists of those players that participated at least once in a gross and in a net tournament in the relevant period. Hence, the comparison of performance among the two types of tournaments is based on the same set of players. Additional controls for different levels of heterogeneity in the participant's field of a specific tournament (as well as tournament fixed effects) are introduced in Appendix 2.

[12] More detailed information about the mentioned variables including the mean and the range is provided in the summary statistics in table A1.

where $SCORE_{ijt}$ is the Stableford score of individual *i* that participated in tournament *j* at date *t*, $TYPE_j$ is a dummy variable that indicates whether tournament *j* is a net or gross tournament, X_i is a vector of individual specific characteristics (e.g. *FEMALE*, and *AGE*), Y_j is a vector of tournament specific characteristics (e.g. *LOC*, *PAR*, *SR*, *CR* and *AVGHANDICAP*), Z_t is a time dummy (for the week in which the tournament was played) and ν_{ijt} is a random error term.

Table 1 provides regression results from specifications based on OLS and fixed effect (FE) models augmented by robust and clustered error structures.[13] In specification (1) and (2) the OLS estimation is based on the above mentioned variables to control for observed individual and tournament-specific characteristics. In specification (2) it is supplemented by 23 week dummies to capture time-specific effects, for instance, weather conditions in the week in which the tournament took place.[14] Further unobserved heterogeneity between players may potentially drive the results. This possibility is controlled for by using a fixed effects approach based on individual players as presented in specification (3) – (5).

As the focus of this analysis is the effect of leveling the playing field with respect to performance, the relevant coefficient in the regression is α_1 for the regressor *TYPE*. Incentive enhancing effects of a leveled playing field would result in a positive coefficient α_1. This is in fact the case in all specifications: the coefficient is positive, highly significant and varies between 0.708 and 1.347 with significance levels around 5 percent. Hence, a player that participates in a net tournament has a significantly higher performance of 0.708 to 1.347 Stableford score points in comparison to a gross tournament, i.e. the player needs on average fewer strokes if she/he competes in tournaments where the playing field is leveled.

To verify the robustness of the established relation the empirical analysis is supplemented by alternative econometric specifications provided in the appendix: In table B1, specification (6) and (7), a random effect model is estimated to control for heterogeneity among different tournaments because a fixed effects approach is not feasible as there is no variation in the *TYPE* variable within a tournament. The results based on this random effects estimation indicate that the incentive enhancing effects of balancing the playing field are not

[13] Alternatively, random effect (RE) specifications are estimated in Table B1, specification (8) and (9). Results are qualitatively similar. A robust Hausman-test for the RE specification in no. (8) and (9) suggests that the FE specifications in table 1 are more appropriate.

[14] Note also, that the variable HANDICAP is excluded from all specifications. The reason for the exclusion of this variable is a potential endogeneity problem because the individual handicap is updated after each tournament participation based on the respective Stableford score. However, including the variable HANDICAP does neither imply a substantive change in size nor significance of TYPE, the variable of interest. Those results are available on request.

due to systematic differences in the heterogeneity of the playing fields among the two tournament types.[15] Hence, the established result also seems to be robust with respect to heterogeneity between different tournaments.

Table 1: Regression Results

Dependent Variable: SCORE	(1) OLS	(2) OLS	(3) FE	(4) FE	(5) FE-DK
TYPE	0.708 **	1.152 *	0.781**	1.347**	0.781***
	(0.311)	(0.615)	(0.320)	(0.627)	(0.289)
PAR	-0.332	-0.250	-0.195	-0.073	-0.195
	(0.268)	(0.273)	(0.287)	(0.292)	(0.294)
SR	-0.029	-0.003	-0.036	-0.003	-0.036
	(0.071)	(0.065)	(0.068)	(0.065)	(0.057)
CR	0.604 *	0.500	0.395	0.261	0.395
	(0.333)	(0.321)	(0.310)	(0.292)	(0.243)
LOC	-0.800	-0.818	-0.641	-0.657	-0.641*
	(0.498)	(0.713)	(0.509)	(0.725)	(0.369)
AVGHANDICAP	-0.178 **	-0.175 **	-0.002	-0.002	-0.002
	(0.073)	(0.078)	(0.075)	(0.083)	(0.067)
FEMALE	-0.470	-0.185	-	-	-
	(0.708)	(0.692)			
JUNIOR	0.519	0.271	-	-	-
	(0.951)	(0.942)			
YOUNG-SENIOR	-0.501	-0.575			
	(0.803)	(0.797)	-	-	-
SENIOR	-1.160	-1.186			
	(0.793)	(0.795)	-	-	-
Constant	18.090	19.462	20.579	20.100	20.579
	(14.215)	(13.910)	(14.528)	(15.192)	(11.962)
Time (Week) Dummies	No	Yes	No	Yes	-
No. of observations	1253	1253	1253	1253	1253
R-squared	0.026	0.047	0.0158	0.0387	0.0158

NOTE: All specifications include robust standard errors in parenthesis that are clustered at the individual level; FE = fixed effects for players; FE-DK = fixed effects for players based on Driskoll-Kraay standard errors that are robust with respect to general cross-sectional or temporal dependencies, see Driscoll and Kray (1988).
* p<0.10. ** p<0.05. *** p<0.01.

An additional empirical approach is presented in table B2 based on Poisson regressions. As the Stableford score could be interpreted as a count variable, the Poisson approach would be the appropriate specification. The effect of the variable TYPE is still positive and significant while the size of the coefficient is not directly comparable because the marginal

[15] This is also suggested by the fact that in all fixed effects specifications the variable AVGHANDICAP is not significant. However, the informational content of this constructed variable might be limited due to data availability.

effects in Poisson models are not constant.[16] The empirical results from Negative Binomial regressions are very similar in all aspects and therefore omitted.

5. Concluding Remarks

By now there exists ample theoretical and empirical evidence from various fields for the adverse incentive effects of large skill or ability differences in tournament-like situations. Based on this well established relation between incentives and heterogeneity a potential policy recommendation would be to (artificially) reduce the underlying heterogeneity of the participating agents to rebuild competitive pressure and spur effort exertion. Policies of balancing the playing field have this objective and are frequently applied, for instance as affirmative action policies, in sports tournaments, public procurement auctions etc.[17]

The empirical approach presented here analyzes the consequences of those types of policies based on data from amateur golf tournaments. It thereby uses a unique feature of amateur golf tournaments to identify the incentive effects of balancing the playing field based on a normalized measure of individual player performance. The empirical results suggest that the same set of players that competes in tournaments with a balanced playing field exerts on average more effort in comparison to tournaments where the playing field is not balanced.

Hence, besides guaranteeing competition on an equitable basis this study indicates that there are also incentive enhancing effects of this type of policy. A limitation of the study could be the fact that tournaments in amateur golf are not incentivized by monetary rewards. Although non-monetary incentives have proven to have important effects on effort exertion in real life contexts, further research in high-stakes environments would be a valuable contribution to investigate the robustness of these results.

[16] Results expressed as incidence rate ratios are available on request.

[17] While there are some empirical studies that analyze those types of policies, for instance in firm specific contexts of public procurement auctions, see Marion (2007) and Krasnokutskaya and Seim (2009), empirical evidence based on individual data is still missing.

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7. Appendix 1

Table A1: Summary Statistics and Description of Variables

Code	Description of Variables	Mean	Range
TYPE	Tournament is gross or net-tournament: 0=gross, 1=net.	0.698	0 or 1
SCORE	Stableford score of a player for a specific tournament.	30.723	12 (worst) – 48 (best)
HANDICAP	Individual handicap of a player.	14.776	4 (strong) - 30.6 (weak)
AVGHANDICAP	Average handicap of the players that competed in the respective tournament and for which data is available	14.776	5.6 – 27.2
LOC (Location)	Tournament takes place at the 'home' golf course of a player or at the course of another golf club: 0=home course, 1=foreign course.	0.327	0 or 1
AGE	4 age groups: Junior, Young Senior, Senior and others that do not fall into any of the first 3 categories .	Junior: 0.136 Y. Senior: 0.212 Senior: 0.513	0 or 1 0 or 1 0 or 1
FEMALE	Gender: 0=male, 1=female.	0.218	0 or 1
PAR	Number of average strokes that a professional player would obtain on a specific golf course (frequently interpreted as a measure for the length of the course).	71.813	64 (short) – 74 (long)
SR (Slope Rate)	Additional measure of the difficulty of the course (which incorporates aspects that are not captured by PAR)	126.068	113 (easy) – 137 (hard)
CR (Course Rate)	Additional measure of difficulty of the course for weak players.	71.706	64 (easy) - 75.1 (hard)

8. Appendix 2

Table B1: Random Effect Regressions

Dependent Variable: SCORE	(6) RE on Tournaments	(7) RE on Tournaments	(8) RE on Players	(9) RE on Players
TYPE	0.897 **	0.920 *	0.737**	1.283**
	(0.397)	(0.546)	(0.310)	(0.620)
PAR	-0.429	-0.423	-0.243	-0.135
	(0.427)	(0.409)	(0.269)	(0.275)
SR	-0.022	-0.021	-0.029	0.003
	(0.077)	(0.080)	(0.067)	(0.063)
CR	0.652 *	0.558	0.431	0.307
	(0.339)	(0.358)	(0.307)	(0.290)
LOC	-0.977 **	-0.726	-0.724	-0.734
	(0.440)	(0.554)	(0.495)	(0.712)
AVGHANDICAP	-0.175 ***	-0.160 **	-0.063	-0.066
	(0.067)	(0.065)	(0.071)	(0.078)
FEMALE	-0.481	-0.248	-0.111	0.187
	(0.536)	(0.555)	(0.682)	(0.676)
JUNIOR	-0.414	-0.220	-0.074	-0.315
	(0.694)	(0.718)	(0.971)	(0.986)
YOUNG-SENIOR	-0.464	-0.456	-0.464	-0.520
	(0.444)	(0.451)	(0.766)	(0.778)
SENIOR	-1.118 **	-1.100 **	-1.406*	-1.436*
	(0.432)	(0.432)	(0.769)	(0.785)
Constant	20.734	24.522	22.120	22.097
	(19.479)	(16.532)	(14.088)	14.426
Time (Week) Dummies	No	Yes	No	Yes
No. of observations	1253	1253	1253	1253
R-squared	0.028	0.107	0.015	0.0374

NOTE: All specifications include robust standard errors in parenthesis that are clustered at tournament level in specification (6) & (7) and at individual level in (8) & (9); RE = random effects for tournaments in specification (6) & (7) and for players in (8) & (9); A robust Hausman-test based on the approach suggested in Wooldridge (2002), p. 290-291, yields p-values of 0.011 for specification (8) and 0.000 for specification (9).
* $p<0.10$.
** $p<0.05$.
*** $p<0.01$.

Table B2: Poisson Regressions

Dependent Variable: SCORE	(10) Poisson	(11) Poisson	(12) FE-Poisson	(13) FE-Poisson
TYPE	0.023 **	0.038 *	0.026 **	0.044 **
	(0.010)	(0.020)	(0.011)	(0.020)
PAR	-0.011	-0.008	-0.006	-0.002
	(0.009)	(0.008)	(0.009)	(0.012)
SR	-0.001	-0.000	-0.001	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)
CR	0.020 *	0.016	0.013	0.009
	(0.010)	(0.010)	(0.010)	(0.012)
LOC	-0.026	-0.027	-0.021	-0.022
	(0.162)	(0.231)	(0.015)	(0.030)
AVGHANDICAP	-0.006 **	-0.006 **	-0.000	-0.000
	(0.002)	(0.003)	(0.002)	(0.002)
FEMALE	0.016	0.006	-	-
	(0.023)	(0.022)		
JUNIOR	0.017	0.009		
	(0.030)	(0.030)	-	-
YOUNG-SENIOR	-0.016	-0.018		
	(0.026)	(0.025)	-	-
SENIOR	-0.038	-0.038		
	(0.025)	(0.025)	-	-
Constant	3.006***	3.042***		
	(0.474)	(0.464)	-	-
Time (Week) Dummies	No	Yes	No	Yes
No. of observations	1253	1253	1253	1253
Pseudo R-squared	0.004	0.006	-	-

NOTE: All specifications are based on Poisson regressions and include robust standard errors in parenthesis that are clustered at the individual level; FE = fixed effects for players.
* p<0.10.
** p<0.05.
*** p<0.01.