

# How does status affect behaviour? A golfing natural experiment

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# Introduction

- The typical approach to studying peer effects does the following:
  - Take some measure of the ability of individuals.
  - Observe the groups within which the individuals interact (e.g. a school class) and calculate the average ability of each persons peers.
  - Look at the correlation between some outcome measure of interest and the average ability of one's peers after controlling for own ability.
- This approach ignores that within groups there is typically a hierarchy, I attempt to assess whether the position of an individual within the hierarchy of a group affects individual behaviour, specifically performance and risk-taking of golf players.
- Why golf?
  - ① A well defined ranking (hierarchy) of individuals, the world rankings.
  - ② Random allocation of players to groups within tournaments.
  - ③ Players are presented with choices over risk.

## Related Literature

- A nascent literature has explored the possibility that agents are concerned with their rank or status within the group to which they compare themselves (for example Frank (1985), Becker, Murphy & Werning (2005) and Hopkins & Kornienko (2009)).
- An implication of the models in this literature is that regardless of monetary incentives, whether an individual is high or low rank within their group of observable peers should affect individual behaviour.
- Although perhaps very distinct from the context that Frank, Becker etc. have in mind, the sport of golf presents convenient features for looking at how status affects behaviour.

## Related Literature

- Guryan et al (2009) studied peer effects within golf tournaments on the men's PGA tour. They found a small negative, but statistically insignificant effect on performance of playing with high skill peers.
- Gneezy et al (2003) in the lab studied how performance was affected by competitive environments, women responded negatively, men positively, but deterioration in female performance was reduced in female-only environments.
- Booth et al (2011) found that male students exhibited greater risk aversion than their female counterparts, but the difference was later reduced for those women in single-sex classes.

# Questions of interest

- Does an individual's rank or status among their immediately observable peers affect their performance?
- Does it affect their strategy/willingness to take risk?
- I consider the world rankings of players as a measure of status, but also age, given the deference given to elders in most cultures.

# The game of golf

- Golf tournaments are typically of two main types, matchplay or strokeplay, the latter are more common and are the focus of attention here.
- Players aim to complete 3-4 rounds of 18 holes over 3-4 days with the lowest number of shots.
- Prior to the tournament players are divided into groups of three for the first two days.
- At the end of the second day the field is reduced, typically the 70 players with the lowest score remain for the final stage of the tournament.
- The players that 'make the cut' compete for prize money, the others leave with nothing.

# LPGA tournaments

- To select playing groups for the first two days play, players are split into A and B seeds. A seeded player are typically the highest ranked or most high profile players.
- Players are in the main randomly selected to groups, however within the A seeds tournament directors may select particular groups for television/commercial reasons.
- After the cut players are assigned to groups based on their performance in the previous rounds (the best performing play together in the last group of the day).
- I will make use of only the outcomes recorded on the first day's play.
- Random assignment of players will be key in identifying the effect of status within a group on performance/risk-taking.

# Are groups randomly chosen?

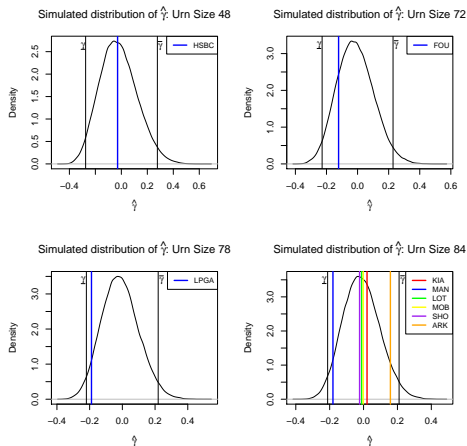
- To test for random assignment I run the following regression for each of the urns for selecting groups in my sample:

$$\frac{R_j + R_k}{2n} = \alpha_0 + \gamma \frac{R_i}{n} + u_i$$

- $R_i$  is the rank of player  $i$  within the urn from which she is picked.
  - $R_j$  and  $R_k$  are the ranks within the urn of player  $i$ 's playing partner.
  - $n$  is the number of players in the urn.
- For a finite urn size, under random assignment the mean of the OLS estimator of  $\gamma$  will not be zero, and for urn sizes as used in the tournaments in the sample it will be far from normally distributed.
- However, the distribution of  $\hat{\gamma}$  under random assignment can be simulated and the observed  $\gamma$  for each tournament urn can be compared to this distribution.

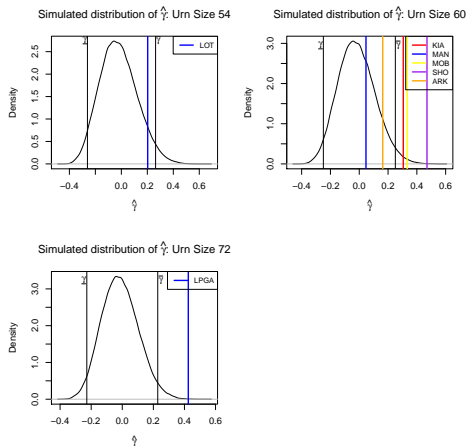


## B Seeded players



**Figure:** Tests of randomization of B seeded players to groups. Distributions of  $\hat{\gamma}$  under the null hypothesis of randomized groups with players ordered according to their official world rank.

# A Seeded players



**Figure:** Tests of randomization of A seeded players to groups. Distributions of  $\hat{\gamma}$  under the null hypothesis of randomized groups with players ordered according to their official world rank.

# Econometric Framework

- The question to be answered is how our outcome variable of interest is affected by being the 1st, 2nd or 3rd highest ranked player in their group.
- Consider the following model for the outcome variable of an individual  $O_i$ :

$$O_i = \alpha_0 + \beta_1 D_{2i} + \beta_2 D_{3i} + \Psi(a_i, X_i) + u_i \quad (1)$$

- $D_{2i}$  and  $D_{3i}$  are dummy variables denoting that player  $i$  is the 2nd or 3rd highest ranked player in their group.
- $\Psi(a_i, X_i)$  is some possibly unknown function of individual ability  $a_i$  and other explanatory variables  $X_i$ .
- $\beta_1$  and  $\beta_2$  are the parameters of interest, they measure the difference in the outcome variable resulting from being 2nd or 3rd ranked in a group rather than 1st.

# Econometric Framework

- Given random assignment one might erroneously assume that we can ignore the unknown function  $\Psi(a_i, X_i)$  and estimate  $\beta_1$  and  $\beta_2$  from a regression of  $O_i$  on  $D_{2i}$  and  $D_{3i}$ .
- Such an approach ignores that the probabilities with which players are 1st, 2nd or 3rd ranked in a playing group vary with their rank in the urn they are picked from.
- The highest ranked players in an urn are most likely to end up as the highest ranked in their group, and in general will be of higher ability so likely to obtain better scores.
- However, given random assignment the probabilities  $Pr(D_{2i} = 1 | R_i)$  and  $Pr(D_{3i} = 1 | R_i)$  are known and allow us to estimate  $\beta_1$  and  $\beta_2$  using the following regression equation:

$$O_i = \alpha_1 + \beta_1(D_{2i} - Pr(D_{2i} = 1 | R_i)) + \beta_2(D_{3i} - Pr(D_{3i} = 1 | R_i)) + \nu_i$$

# Results: Score as outcome variable

**Table:** The effect of rank on score

	(1)	(2)	(3)	(4)	(5)	(6)
<i>World Rank in group</i>						
2nd in group	0.109 (0.360)	0.040 (0.351)	- -	- -	0.096 (0.362)	0.038 (0.353)
3rd in group	0.381 (0.439)	0.318 (0.428)	- -	- -	0.361 (0.441)	0.298 (0.430)
<i>Age Rank in group</i>						
Middle-aged	- -	- -	-0.105 (0.352)	-0.004 (0.345)	-0.102 (0.355)	0.001 (0.347)
Youngest	- -	- -	0.093 (0.432)	0.236 (0.422)	0.070 (0.435)	0.210 (0.425)
Seed group fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	Yes	No	Yes	No	Yes
$R^2$	0.157	0.202	0.157	0.202	0.157	0.203
$N$	696	696	696	696	696	696

\* indicates significantly different from zero at 10% level, \*\* 5% and \*\*\* 1%.

Standard errors in parentheses.

Additional controls are rank within urn, age and age-squared.

# Results: Variance of score as outcome variable

**Table:** The effect of rank on variance of score

	(1)	(2)	(3)	(4)	(5)	(6)
<i>World Rank in group</i>						
2nd in group	-0.040 (0.026)	-0.042 (0.026)	- -	- -	-0.043* (0.026)	-0.045* (0.026)
3rd in group	-0.011 (0.031)	-0.013 (0.031)	- -	- -	-0.012 (0.031)	-0.014 (0.031)
<i>Age Rank in group</i>						
Middle-aged	- -	- -	-0.031 (0.026)	-0.028 (0.025)	-0.036 (0.025)	-0.033 (0.025)
Youngest	- -	- -	-0.040 (0.031)	-0.035 (0.031)	-0.045 (0.031)	-0.040 (0.031)
Seed group fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	Yes	No	Yes	No	Yes
$R^2$	0.043	0.052	0.042	0.050	0.052	0.060
$N$	696	696	696	696	696	696

\* indicates significantly different from zero at 10% level, \*\* 5% and \*\*\* 1%.

Standard errors in parentheses.

Additional controls include rank in urn, age and age-squared.

# Conclusions

- Based on the currently available sample there are no significant effects of rank within a group on a player's score. However, point estimates suggest being the worst in a group leads to a worse performance.
- Taking variance of the score across holes as a proxy for risk-taking suggests that players take the least risk when assigned to a group where they are the mid-ranked individual.
- Relative age within a group has little effect on player's scores, but point estimates suggest that players take the most risk when they are the eldest in a group.