Races vs. Tournaments. Field Experimental Evidence from An Online Competition.

Andrea Blasco and Michael Menietti

# Abstract

# Experimental Design

The plan of the experiment is to sort participants into groups homogenous by distribution of skills, experimental task, prize pool, etc. The only difference would lie in the criterion used to rank order efforts at the end of the competition. This in turn would affect the dispensation of prizes and therefore the strategic interactions among participants, which is the object of our study.

In half of the groups, we fix a target level *Q>0* such that any solution of quality below Q would be ranked last and would not qualify for prizes. Then we rank order all other solutions above Q by the *time* *of submission in the group*, so that earlier submissions are ranked higher. In the other half groups, submissions are rank ordered just by *quality.* That is, regardless of the time of submission, solutions of higher quality are also ranked higher.

We name the first setting a *race* and the second a *tournament*.

# Motivations

Motivations to study races & tournaments are well summarized by the following picture:



FIGURE: Equilibrium bids from the Moldovanu & Sela (2001) model for a Tournament (black, solid) & a Race (red, dashed).

The picture shows the realized equilibrium bidding function of an extended version of Moldovanu and Sela (2001) model of tournaments competition.

As opposed to the original model, we consider that participants have to make 2 decisions: a costly bid *q* and some costly effort *t*to accelerate the time to submit.

It turns out that the solution of the extended model is very simple. In particular, conditional on exerting positive effort in the competition, bidding q=Q is a dominant strategy in any MS-race (likewise choosing t=0 is a dominant strategy in the MS-tournament). As a result, the bidding function is a step function in a race (red, dashed) and a continuous function in a tournament (black, solid).

The key observation is that no setting seems to dominate the other in terms of the quality of the final outcomes. In fact, suppose that the x-axis denotes the ability of the best participant registered to the competition. Then, there is an interval of values in the middle of the x-axis in which the race would do better, while for higher values the tournament would do better.

Thus, if we knew who registered to the competition we would also have known which setting to choose. But what competition format is best from an ex-ante perspective? The answer would depend on the distribution of abilities. This would require some computations, but if top-coders are relatively scarce, then a race may be a better option to consider.



FIGURE: distribution of abilities used to plot the bids in the previous figure

In sum, according to our extended MS model, it seems that outcomes in a race can be higher when the (expected) “intensity of competition” is somewhat low. Otherwise the tournament seems a better option.

Note, no prior works comparing races with tournaments—see lit. section at the end of this document—(Why?)

## Limitations

One obvious limitation of this setting is that MS may explain well a tournament setting, but not a race. In fact, a race is more a dynamic type of contest where participants could benefit a lot form feedback generated during the competition by others (e.g., stop exerting effort, waiting, etc.). On the other hand, we can use individual data to see if there is a good fit.

## Unit of analysis

The unit of analysis should be the group. We need many groups.

# Details of the Experiment on TopCoder

|  |  |  |  |
| --- | --- | --- | --- |
|  | Tournament | Race | Open issues: |
| Pre-contest | - | We need to set a quality threshold  Invite TopCoder experts to provide feedback on a reasonable quality threshold (“bootstrap”). | *Can we set hard & easy thresholds?*  ***Pro****: more robust if we misspecify the threshold.* ***Contra****: can we extend the model?* |
| Advertising | - |  |  |
| Submission Period | Two weeks. | Two weeks.  The submission period stops as soon as 2 members hit the quality threshold. |  |
| Prizes | Top 2 ranked solutions by quality. | First 2 solutions to hit the quality threshold. | **Should #2 prize be the same of #1 prize?**  **Should we add a general prize across groups? No!** |
| Provisional Score | The leaderboard shows the provisional score. | The leaderboard shows the provisional score.  In the background we compute the final score.  If someone hits the threshold we send notification to all participants in that group. |  |
| On each submission | Pop-up asking how many hours worked. | Pop-up asking how many hours worked. |  |
| Group size | If enough sample:  Groups of different size: 7 and 30 | If enough sample:  Groups of different size: 7 and 30 |  |
|  |  |  |  |
| Prevent cheating | Ex-post we control winning submissions | Ex-post we control winning submissions |  |

# Literature Review

## Theory

* Moldovanu & Sela (2001)
  + We extend to incorporate a race.
* Harris & Vickers (ReStud, 1985) “Racing with uncertainty”
  + Interplay of *uncertainty* in the outcomes of effort and *strategic interaction* between competitors.
  + Leaders make greater efforts as the gap with the followers widens.
* Fudenberg, Gilbert, Stiglitz, Tirole (EER, 1983)
  + When races are neck-to-neck and when degenerate into monopoly?
* Zizzo (IJIO, 2002)
  + lab. experiment on H&V predictions.
  + Not as predicted!
* Baye & Hoppe (GEB, 2003)
  + Tullock contest function races are equivalent to tournaments.

## Surveys

* Konrad (book)
* Decheneaux, Kovenock, Sheremeta (2012)
  + Dynamic contest: one paragraph on races. Mainly Zizzo’s results.

## Something to read

* Hoppe & Lehman-Grube (JET, 2005), “Innovation timing games: a general framework with applications“