University of Innsbruck

Psychological Pressure in Competitive Environments: Evidence from A Randomized Natural Experiment: Comment

Francesco Feri, Alessandro Innocenti, Paolo Pin

eeecon
Research Platform
Empirical and Experimental Economics

Psychological Pressure in Competitive Environments: Evidence from A Randomized Natural Experiment: Comment[*]

Francesco Feri[†], Alessandro Innocenti[‡], Paolo Pin[§]

December 6, 2010

Abstract

In contrast with Apesteguia and Palacios–Huerta (2009), we provide laboratory evidence that strictly competitive environments are characterized by a second–mover advantage. This finding is obtained in a setting, a free–throw shooting competition among pairs of professional basket players, which overcomes the major limitations of Apesteguia and Palacios-Huerta's randomized natural experiment.

JEL Classification: C93.

Keywords: second–mover advantage, competitive environments, psychological pressure, experiment.

[†]Department of Economics, University of Innsbruck (Austria)
[‡]Dipartimento di Politica Economica, Finanza e Sviluppo, Universitá degli Studi di Siena (Italy) and LabSi Experimental Economics Laboratory (Italy)
[§]Dipartimento di Economia Politica, Universitá degli Studi di Siena (Italy)

1 Introduction

In a forthcoming paper in the American Economic Review, Apesteguia and Palacios–Huerta (2009) (hereafter AP (2009)) provide empirical data from a randomized natural experiment showing that in a strictly competitive environment - i.e. 129 penalty shoot-outs in the major international soccer competitions - being first mover significantly increases the probability of winning. They interpret this finding as evidence that kicking second put players under psychological pressure, which would hinder their scoring probability, because in expectation there are higher chances to score a penalty than to miss it.[1] As AP (2009) state, this outcome may also depend on the opposite effect on the goalkeeper, whose performance would benefit from being second in the shoot–out. To refute this argument, they report regressions proving that goalkeeper's saves have a weaker impact on the penalty outcome than kicker's misses.

Kocher, Lenz and Sutter (2010) (hereafter KLS (2009)) check the robustness of the result on a larger data set of 470 shoot–outs including those from AP (2009). They find that the probability of winning for the first-kicking teams is not significantly different from 50%, in contrast with the 60.5% reported by AP (2009), and conclude that "first–mover advantage in sequential tournaments do not appear to be robust" (p. 6). The result is attributed by KLS (2010) to the fact that AP (2009) uses a subsample "without a coherent criterion for data inclusion".

This setting is assessed by the authors as valuable for understanding the impact of cognitive and emotional factors on subjects' performance in real life. Although external validity is highly desirable for evaluative research, in the experiment under consideration there are some drawbacks that limit the validity of the results. Firstly, during the game penalties are usually kicked by the team's specialist, while in shoot-outs most kickers face a largely uncommon decision–making environment.[2] Team performance could be consequently attributed to individual differences in cognitive anxiety (Dohmen, 2008). Secondly, players' heterogeneity could also make relevant the penalty kicks sequence, which is not randomized and chosen by the team trainer. Finally, goalkeeper's ability is a key endogenous factor for kicker's scoring probabilities.

---

[1] Kolev, Pina and Todeschini (2010) analyze ice–hockey, where the probability of scoring a penalty is much lower than 50%: they find a second mover advantage which they explain with the same argument, reversed.

[2] As an example: in the 380 games of the soccer English Premier League 2009/2010, out of the 530 players that played at least a game, only 49 (9%) took at least one of the 106 awarded penalties. It comes out that taking a penalty is an unusual task, given that, even among players kicking at least one penalty in the season, the average is around 2 penalties per season.

In order to check the validity of the finding, we design an experiment where these limitations are all eliminated. In our setting, a free–throw competition among pairs of professional basket players, we obtain clear evidence supporting an opposite second mover advantage.

2 Experimental design

In our experiment fourteen basket professional players are involved in a series of free–throw competitions in pairs. The experiment was carried out in September 2010 on junior (with age from 17 to 19) professional basket players of the Mens Sana Siena Basket team, who are 2009/2010 Italian Champions. A single competition between two players had the following rules: one player shot five free-throws, then the second player performed the same exercise. In case of a tie each of the two had the opportunity to try a single free–throw each, and in case of enduring tie this tie breaking rule was always repeated. We chose this setup because firstly it makes a clearer distinction between first and second movers, as in the alternating case in–between standings contemplate many more possibilities; secondly, it involves a competition which all the participants are used to.

In the first round subjects were randomly assigned to two groups of seven players each. To track the performance of each player in any possible order, with different opponents, in every group we organized two round-robin tournaments so that each player met twice all the other players, being once first–mover and once second–mover. The result of each group in the first round determined the positions in a single–elimination play–off second round, where all the fourteen players participated.[3] Figure 1 shows the location and one moment during round one of the experiment. The experiment lasted approximately two hours.

Each participant received a fixed show–up fee of ten euros. In this first round they gained additional five euros for each won match. The unique winner of the play–offs

---

[3]The two winners (according to the number of won matches) of the two groups in the first round automatically passed to quarter–finals, while the others were coupled, so that the second of one group met the last of the other, the third classified players met the sixth classified, and the fourth met the fifth. In the matches of the second round the first mover was chosen randomly with uniform probabilities. Apart from that, the rules of each match were the same as in the first round. We did not use data from the second round of the experiment, because, as discussed below, participants were provided with different incentives from the first round. However, we included the second round in the subjects' task, so that they had an additional incentive to perform at best in every match of the first round.

Figure 1: A photo of the experiment.

obtained an additional prize of ninety euros. All the payoffs were paid immediately after the experiment. For the sake of our analysis we used only the data from round one of the experiment, where every single match gave to its winner five euros and the possibility to achieve a better ranking for the play–offs.

We want to stress the characteristics of our experimental design that make our study of interest comparing with those of AP (2009) and KLS (2010). This design was intended to address the problems of the two studies under consideration pointed out above. Namely, (i) we analyzed individual player's behavior and not team's performance; (ii) the impact of players' heterogeneity was greatly reduced by the chosen type of tournament; (iii) the result of every single free–throw depended only on its author and not on anyone–else (as a goalkeeper in soccer); (iv) we can even analyzed the same couple of opponents twice, in both orders.

3   Results

We analyzed only the data from the first round of the experiment to keep homogeneous experimental conditions. Therefore we consider two groups of seven players where each met the other six twice. In this way we have a total of 940 free–throws in 84 matches, in which each of the 14 basket players shoots an equal number of times as first and

Group & player	Experiment #	score	prop	Season 2009/10 #	score	prop	
A1	63	41	0.65	53	37	0.70	
A2	71	43	0.61	120	78	0.65	
A3	60	43	0.72	29	15	0.52	
A4	63	40	0.63	41	22	0.54	
A5	63	35	0.56	68	25	0.37	**
A6	71	47	0.66	65	29	0.45	**
A7	61	41	0.67	12	7	0.58	
B1	76	42	0.55	61	39	0.64	
B2	69	33	0.48	169	88	0.52	
B3	69	38	0.55	-			
B4	73	43	0.59	47	20	0.43	
B5	65	47	0.72	25	19	0.76	
B6	67	46	0.69	-			
B7	69	45	0.65	30	13	0.43	**

****(**) significative different at 1%(5%) level

Table 1: Two sample test of proportion for all the participants between their results in the Experiment and their score in the Season 2009/2010

second.

In order to control for the effort of each player we confront (Table 1) their results in the experiment with their average scoring in the free–throws of the season 2009/2010, that ended three months before the experiment was conducted. On aggregate, the success rate on these free–throws is slightly above 60% and comparable with the success rate of previous season. We are able to compare with a sample test of proportion only 12 out of 14 participants. Only for three of them it is possible to reject at the 5% confidence level the assumption that the results in the experiment and those in the matches of the previous season come from the same Bernoulli distribution. We argue that even if the environment and the psychological pressure of regular basket matches is different from the one of the experiment, this does not affect the ex–ante probabilities of success in free–throws.

Moreover the experimental success rate, being more than 50%, is consistent with the assumptions that would allow the explanation made by AP (2009) for their result: if a positive performance of the first mover had a negative effect on the second mover, being this event more likely we should observe a first mover advantage.

From this data we can estimate the probability to win, given the position of the player (first or second mover) and controlling for the performance in the first 5 free throws. Assuming that these probabilities follow a logit distribution, we find that there is

	coeff	std. error
second mover	0.831**	0.401
score in the first 5 throws	1.633***	0.266
constant	-5.466***	0.906
marginal effect of second mover	0.205**	0.096

*** (**) statistically significant at 1% (5%) level

Table 2: Determinants of Success of a Free Throw

actually a second–mover positive effect, i.e. to move for second increases the chance to win of about 17% (Table 2).

This result is consistent with the descriptive statistic that out of 84 matches, 46 are won by the second moving player. Moreover we find that the matches that drive this result are those that end by the tie breaking rule. Indeed we observe that in the 66 matches ended in the first stage, first and second movers share an equal number of victories. Instead, in the 18 matches ended by the tie breaking rule, for 13 times the winner was the second mover. One interpretation of this evidence is that the advantage for the second mover happens when the cost of a mistake is higher.

4 Discussion

Our result is in contrast with AP (2009), who find a positive first–mover effect, and KLS (2010), who find no significant effect. We provide evidence of a second–mover advantage, as Kolev, Pina and Todeschini (2010) do for the case of ice–hockey. However, both AP (2009) and Kolev, Pina and Todeschini (2010) give the same explanation for their result: when it is more likely to score, as in basketball and soccer, the first–mover is more likely to lead the standings, when the opposite is true, as in ice–hockey, the first mover is worst off. We start from a situation in which, according to previous explanation, a first–mover advantage should be observed, and we end up with the opposite finding. Moreover, the second–mover advantage in our experiment is evident when, after a tie in the regular match, we apply the alternating tie breaking rule of one throw for each player and the psychological pressure of the match is higher.

The reason for this result relies probably in the nature of the technical exercise we considered, in relation to the sport of basketball: basket players are trained to execute free throws.[4] Due to the rules of the game, that in many cases fix who must throw, in

---

[4]See Gonzáles–Díaz Gossner and Rogers (2010) for a related discussion on tennis players.

a season each player experiences this situation of psychological pressure a lot of times, and it is always possible for each player that his result determines the outcome of a game.

We think that, for the above reasons, the exercise that we analyze is much more similar to everyday life activities that people experience in their profession, as it is something that they face often, they know it, and each time the result may have an important impact on their personal utility.

References

[1] Apesteguia, José and Ignacio Palacios-Huerta (2009) "Psychological Pressure in Competitive Environments: Evidence from a Randomized Natural Experiment", mimeo, forthcoming on American Economic Review.

[2] Dohmen, Thomas J. (2008) "Do Professionals Choke under Pressure", Journal of Economic Behavior & Organization 65, 636-653.

[3] Gonzáles–Díaz, Julio, Olivier Gossner and Brian W. Rogers (2010) "Performing Best when it Matters Most: Evidence from Professional Tennis", mimeo.

[4] Kocher, Martin G., Marc V. Lenz and Matthias Sutter (2010) "Psychological Pressure in Competitive Environments: Evidence from a Randomized Natural Experiment: Comment", IZA Discussion Paper 4846.

[5] Kolev, Gueorgui I., Gonçalo Pina and Federico Todeschini (2010) "Overconfidence in Competitive Environments: Evidence from a Quasi-Natural Experiment", mimeo.

University of Innsbruck - Working Papers in Economics and Statistics
Recent Papers

2011-03 **Francesco Feri, Alessandro Innocenti, Paolo Pin:** Psychological pressure in competitive environments: Evidence from a randomized natural experiment: Comment

2011-02 **Christian Kleiber, Achim Zeileis:** Reproducible Econometric Simulations

2011-01 **Carolin Strobl, Julia Kopf, Achim Zeileis:** A new method for detecting differential item functioning in the Rasch model

2010-29 **Matthias Sutter, Martin G. Kocher, Daniela Rützler and Stefan T. Trautmann:** Impatience and uncertainty: Experimental decisions predict adolescents' field behavior

2010-28 **Peter Martinsson, Katarina Nordblom, Daniela Rützler and Matthias Sutter:** Social preferences during childhood and the role of gender and age - An experiment in Austria and Sweden. *Revised version forthcoming in Economics Letters*

2010-27 **Francesco Feri and Anita Gantner:** Baragining or searching for a better price? - an experimental study. *Revised version accepted for publication in Games and Economic Behavior*

2010-26 **Loukas Balafoutas, Martin G. Kocher, Louis Putterman and Matthias Sutter:** Equality, equity and incentives: an experiment

2010-25 **Jesús Crespo-Cuaresma and Octavio Fernández Amador:** Business cycle convergence in EMU: A second look at the second moment

2010-24 **Lorenz Goette, David Huffman, Stephan Meier and Matthias Sutter:** Group membership, competition and altruistic versus antisocial punishment: Evidence from randomly assigned army groups

2010-23 **Martin Gächter and Engelbert Theurl:** Convergence of the health status at the local level: Empirical evidence from Austria

2010-22 **Jesús Crespo-Cuaresma and Octavio Fernández Amador:** Buiness cycle convergence in the EMU: A first look at the second moment

2010-21 **Octavio Fernández-Amador, Josef Baumgartner and Jesús Crespo-Cuaresma:** Milking the prices: The role of asymmetries in the price transmission mechanism for milk products in Austria

2010-20 **Fredrik Carlsson, Haoran He, Peter Martinsson, Ping Qin and Matthias Sutter:** Household decision making in rural China: Using experiments to estimate the influences of spouses

2010-19 **Wolfgang Brunauer, Stefan Lang and Nikolaus Umlauf:** Modeling house prices using multilevel structured additive regression

2010-18 **Martin Gächter and Engelbert Theurl:** Socioeconomic environment and mortality: A two-level decomposition by sex and cause of death

2010-17 **Boris Maciejovsky, Matthias Sutter, David V. Budescu and Patrick Bernau:** Teams make you smarter: Learning and knowledge transfer in auctions and markets by teams and individuals

2010-16 **Martin Gächter, Peter Schwazer and Engelbert Theurl:** Stronger sex but earlier death: A multi-level socioeconomic analysis of gender differences in mortality in Austria

2010-15 **Simon Czermak, Francesco Feri, Daniela Rützler and Matthias Sutter:** Strategic sophistication of adolescents - evidence from experimental normal-form games

2010-14 **Matthias Sutter and Daniela Rützler:** Gender differences in competition emerge early in live

2010-13 **Matthias Sutter, Francesco Feri, Martin G. Kocher, Peter Martinsson, Katarina Nordblom and Daniela Rützler:** Social preferences in childhood and adolescence - a large-scale experiment

2010-12 **Loukas Balafoutas and Matthias Sutter:** Gender, competition and the efficiency of policy interventions

2010-11 **Alexander Strasak, Nikolaus Umlauf, Ruth Pfeifer and Stefan Lang:** Comparing penalized splines and fractional polynomials for flexible modeling of the effects of continuous predictor variables

2010-10 **Wolfgang A. Brunauer, Sebastian Keiler and Stefan Lang:** Trading strategies and trading profits in experimental asset markets with cumulative information

2010-09 **Thomas Stöckl and Michael Kirchler:** Trading strategies and trading profits in experimental asset markets with cumulative information

2010-08 **Martin G. Kocher, Marc V. Lenz and Matthias Sutter:** Psychological pressure in competitive environments: Evidence from a randomized natural experiment: Comment

2010-07 **Michael Hanke and Michael Kirchler:** Football Championships and Jersey sponsors' stock prices: an empirical investigation

University of Innsbruck

Working Papers in Economics and Statistics

Francesco Feri, Alessandro Innocenti, Paolo Pin

Psychological pressure in competitive environments: Evidence from a randomized natural experiment: comment

Abstract
In contrast with Apesteguia and PalaciosHuerta (2009), we provide laboratory evidence that strictly competitive environments are characterized by a second-mover advantage. This finding is obtained in a setting, a free-throw shooting competition among pairs of professional basket players, which overcomes the major limitations of Apesteguia and Palacios-Huerta's randomized natural experiment.