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Ask not what economics can do for sports - Ask what sports can do for economics

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ABSTRACT

In this article we list the advantages of using sports data for economic research. We also provide a rich overview of economic literature that used sports data to test different fundamental economic theories as well as articles that presented divergences of economic decision making from neo-classical theories. Finally we present articles that were published in this special issue on behavioral economics and decision making in sports, all of which try to answer more general questions by means of sports data.

1. Introduction

There are two ways to look at the relationship between economics and sport. The first is economics *of* sports, where economics is used "in the service" of sports industry to analyze profitability of clubs, attendance demand, competitive balance, etc. However, the aim of this article and the special issue is to concentrate on economics *in* sports. Or in a paraphrase from the inaugural address of John F. Kennedy we ask not what economics can do for sports, but what sports can do for economics. That approach follows the idea that if stones falling from towers and apples from trees are useful for physics, then data from sports competitions may be useful for economics (Palacios-Huerta, 2014). The reason for such a usefulness is that nature rarely creates a situation that allows a clear view of different phenomena because of the complexity of the real-world. However, sports data allow to overcome such obstacles by providing an excellent laboratory to study human behavior in real competitive environments. The importance of "economics *in* sports" cannot be better expressed than the following quote from a Nobel Prize Laureate Daniel Kahneman (2008) does: "Studying sport is a great idea, because people make many decisions that matter enormously to them under standard conditions. It is actually one of the best places to do this". In the same spirit, another Nobel Prize Laureate, Gary S. Becker, referred to soccer as an important setting that allows testing of economic behavior, such as efficient markets and social influences on behavior (Palacios-Huerta, 2014).

More specifically, utilizing data from professional sports where contestants have strong incentives to win has several advantages. First, it eliminates any possible skepticism about applying behavioral insights obtained in a laboratory to real-life situations. As another Nobel Prize Laureate in economics, Robert (Israel) Aumann has asserted "in experiments … the monetary payoff is usually very small. More importantly, the decisions that people face are not ones that they usually take, with which they are familiar. The whole setup is artificial. It is not a decision that really affects them and to which they are used" (Hart, 2005, p. 712).[2] Because sports contests involve high-stake decisions that are familiar to the agents, they overcome this limitation of lab experiments. Second, sports data provide a unique opportunity to observe and measure performance as a function of different variables of interest such as heterogeneity in abilities, incentives, gender, etc. Finally, at each point in time, the contestants have complete information about their relative position, which is useful in case of strategic allocation of efforts. Indeed, as Kahn (2000) argues, sports data are very unique in that they embody a large amount of detailed information that can be used for research purposes.[3] Such advantages of sport data led to the establishment of a unique research area, which is constructed of three edges: economics, psychology, and sport (see Fig. 1).

The remainder of the article is organized as follows: Section 2 reviews studies that tested fundamental economic theories. Section 3 presents articles that showed divergences of economic decision making from neo-classical theories. In Section 4 we present the studies in the current special issue. Finally, in Section 5 we offer concluding remarks.

2. Testing fundamental economic theories

In recent decades there is a growing number of studies that have used sports data to explain fundamental economic theories. For example, it has been well-documented that higher stakes enhance the performance of higher ability players in golf (Ehrenberg and Bognanno, 1990) and in tennis (González-Díaz, Gossner and Rogers, 2012; Jetter and Walker, 2015; Iqbal and Krumer, 2019). Croxson and Reade (2014) used the event of scored goals in soccer before half-time to test the efficient market hypothesis (Malkiel and Fama, 1970).

[2] See also Levitt and List (2008) and Palacios-Huerta and Volij (2009) for discussion on additional limitations of lab experiments.

[3] See Balafoutas, Chowdhury and Plessner (2019) for additional discussion on advantages of using sports data in economic research. See also Morgulev, Azar and Lidor (2018) for discussion of the usage of sports data in the era of big data.

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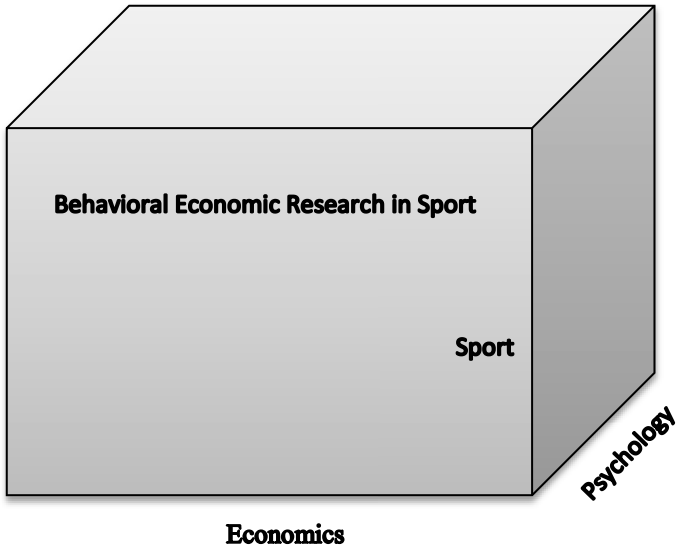

Fig. 1. The area of behavioral economic research in sport.

Kleven, Landais and Saez (2013) used migration patterns of soccer players to show the effects of taxation on the labor market. Deutscher et al. (2020) used soccer games to test signaling theories in the labor market. Abramitzky et al. (2012) showed that professional tennis players' behavior is consistent with optimal decision making when challenging umpires' calls. In another tennis related study, Walker and Wooders (2001) showed that tennis players served according to the mixed-strategy equilibrium. In a similar spirit, Palacios-Huerta (2003) showed that professional soccer players' behavior during penalty kicks was in line with the Minimax theorem.

Several studies have found evidence of strategic allocation of efforts in line with models in contest theory. For example, Malueg and Yates (2010) described strategic momentum in professional tennis, Krumer and Lechner (2017) showed the validity of backward induction in Olympic wrestling competitions, and Brown (2011) presented a negative effect of the presence of a superstar in professional golf.

Sports data also allow to observe rational, but welfare-reducing reaction to incentives, such as sabotage, free-riding, losing in purpose for the future gain (tanking) and even corruption, which are very difficult to observe in other real-life settings. For example, Balafoutas, Lindner and Sutter, (2012) and Morgulev and Galily (2019) used data from judo and soccer respectively to illustrate that costless destructive activities result in an increased use of sabotage. Deutscher et al. (2013) used soccer data to show that lower ability agents are more tempted to engage in destructive actions. Neugart and Richiardi (2013) presented the well-known free-riding phenomenon in swimming relay competitions. A different non-ethical act of tanking was presented by Taylor and Trogdon (2002) in the NBA and more recently by Fornwagner (2019) in the National Hockey League. Both studies showed that teams that have lost their chance to qualify for the play-offs had an incentive to lose in the remaining games of that season in order to increase their odds of a better draft position in the future. Duggan and Levitt (2002) took advantage of a sharp non-linearity in expected payoffs of contestants to describe even a more corrupt type of behavior by showing that professional sumo fighters preferred to lose their last fight of the current season when it was not relevant for them in exchange for securing a victory in the next season. Elaad, Krumer and Kantor (2018) showed that such a trade-off between losing in the last game of a soccer season and winning in the following season occurs significantly more frequently in countries known to be corrupt.

3. Testing behavioral deviations from the "optimal" performance

After many decades in which economists assumed that performance depended neither on the social context of the task environment nor on the psychological state of the performers, there is a growing "psychologization" of economics. One of the biggest pushes to such a recognition was driven by the ideas presented in prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992) that used cognitive psychology to explain divergences of economic decision making from neo-classical theories.

Sports data was very instrumental to show biases in decision making, that is, deviations from the "optimal" performance. For example, many sports related articles followed Baumeister's (1984) seminal study on "choking under pressure" according to which an increased level of incentives beyond an optimal level may harm performance. For instance, Paserman (2010) as well as Cohen-Zada, Krumer, Rosenboim and Shapir (2017) showed that professional tennis players choke more in the most important junctures of the match. Hickman and Metz (2015) found that higher stakes in professional golf increase the likelihood of missing a shot on the final hole. Cao, Price and Stone (2011) as well as Toma (2017) presented evidence on choking under pressure in free-throw shots in very close games in professional basketball. Dohmen (2008) found that soccer players are more likely to choke on a penalty kick when playing in front of their home audience. A similar negative effect of competing in front of a supportive audience was found in the shooting task in professional biathlon (Harb-Wu and Krumer, 2019) and in free throws in professional basketball (Böheim, Grübl and Lackner, 2019).[4]

Another well-known example that attracted much further discussion in the literature is the seminal article by Gilovich, Vallone and Tversky (1985), who originally coined the term "the hot hand fallacy", according to which the hot streaks in performance of basketball players are most likely due to random variation, and are only a cognitive illusion and a general misconception of chance. Several follow-up articles in sports psychology agreed with the fallacy statement (for example, Koehler and Conley, 2003; Avugos et al., 2013). However, by using statistical measures with superior identifying power over previous studies, Miller and Sanjurjo (2014) and later Miller and Sanjurjo (2018)

[4] For additional references on the link between incentives and performance, see the comprehensive review of Gneezy, Meier and Rey-Biel (2011). In addition, see Beilock and Gray (2007) for a psychological review of choking in sports.

actually contradicted these findings showing that the hot hand is not an illusion.[5]

The most related literature to the hot hand is the literature on the existence of momentum, which was described by a Nobel Prize Laureate, Eugene Fama as the biggest challenge to his theory of financial market efficiency.[6] The results are mixed. On the one hand, Malueg and Yates (2010) found no significant effect of psychological momentum in the third set of tennis matches. Similarly, Morgulev, Azar and Bar-Eli (2019) found that momentum played no significant role in overtimes of NBA games. On the other hand, Cohen-Zada, Krumer and Shtudiner (2017) found a positive effect of psychological momentum in bronze medal fights in professional judo, but only among men. A similar, significant effect of momentum was observed in professional tennis by Gauriot and Page (2019a), as well as in professional golf by Rosenqvist and Skans (2015). Thus, it seems that we need additional evidence from other settings to test the existence of psychological momentum.

Another field where sports shed new light relates to the literature on discrimination and favoritism. For example, Szymanski (2000) showed a strong evidence of discrimination against black players in English soccer. Garicano, Palacios-Huerta and Prendergast (2005) as well as Sutter and Kocher (2004) showed the effect of the social pressure on soccer referees who favor home teams by adjusting the injury time according to the interim score. Zitzewitz (2006) found that judges assign significantly higher grades to athletes from their nationality in international ski jumping and figure skating competitions. Sandberg (2018) found a similar result in dressage competitions. Pope and Pope (2015) showed that referees favor their compatriot players by assigning them more beneficial foul calls in the UEFA Champions League games. Price and Wolfers (2010) found that NBA players had fewer fouls called against them when their race matched that of the refereeing crew. Pope, Price and Wolfers (2018) performed a follow-up study and showed that the racial bias disappeared after widespread media coverage. These exemplify that sports related studies not only illustrate fundamental societal problems, but also show the way to solve them.

There is also a large body of literature on the effect of the order of actions, which may create ahead-behind asymmetry and thus affect performance. For example, Apesteguia and Palacios-Huerta (2010) found that the first kicking team in the soccer penalty shoot-outs had a higher probability of winning. Although Kocher, Lenz and Sutter (2012) as well as Arrondel, Duhautois and Laslier (2019) challenged that result, Palacios-Huerta (2014) reproduced this first-mover advantage using a significantly larger sample size than in the two challenging articles (including the entire data of Kocher, Lenz and Sutter (2012)). Similar first-mover advantage was also found in a multi-stage chess contest by González-Díaz and Palacios-Huerta (2016). A significant effect of ahead-behind asymmetry was also demonstrated in the weightlifting (Genakos and Pagliero, 2012) and diving (Genakos, Pagliero and Garbi, 2015) competitions. Cohen-Zada, Krumer and Shapir (2018) showed that the order of actions that is used in tennis tiebreak game eliminates the effect of ahead-behind asymmetry.

Finally, it is worthwhile to mention several other studies that used sports data to show additional intriguing behavioral patterns, which may induce further research. For example, Pope and Schweitzer (2011) provided evidence of loss aversion in professional golf. Dreber, Gerdes and Gränsmark (2013) described the relationship between risk taking and attractiveness in chess. Bar-Eli et al. (2007) showed a strong tendency to jump and too little to stay at the goal center among goalkeepers in soccer penalty kicks, demonstrating an action bias. Bartling, Brandes, and Schunk (2015) used soccer games to investigate the reference point. Berger and Pope (2011) emphasized the importance of loss aversion and diminishing sensitivity by showing that being slightly behind at half-time of basketball games may increase the probability of winning. Jiang (2020) found that the presence of a teammate enhances the performance of female swimmers, but not that of male. Gauriot and Page (2019b) showed that luck is overly influencing soccer managers' decisions. Morgulev et al. (2014) presented evidence that basketball players are over-optimistic in their decision to fall with the hope to receive an offensive foul. In the same spirit, another Nobel Prize Laureate, Richard Thaler, together with Cade Massey, used data from NFL to show that decision making of managers during draft in the NFL is not consistent with rational expectations and efficient markets, but rather consistent with psychological research (Massey and Thaler, 2013).

4. Overview of the articles in this special issue

There are ten articles in this special issue, who use data from five different sports: soccer, basketball, baseball, chess, and archery. Seven articles utilized data from real competitions, two articles used experimental settings and another article used data from real competitions and supported its findings in a lab experiment.

4.1. Effect of pressure on performance

Bucciol and Castagnetti (this issue) utilized data from archery competitions to investigate whether the performance of participants deteriorates in a tiebreak where the pressure is the highest. They find a significant drop in performance in a tiebreak, which is in line with previous findings in the literature. Moreover, the authors find that the drop in performance in the most prestigious tournament is even higher, but only among women.

Dilmaghani (this issue) investigated time pressure on performance in chess tournaments. Using about 1.8 million observations, Dilmaghani finds that women underperform their male counterparts in fast chess games. It also finds that female underperformance is greater among the elite players.

Krumer (this issue) utilized data from penalty shoot-outs between teams from different divisions in national cups of the top five European soccer countries. Krumer tests whether higher ability agents enhance their performance when the stakes are greater or they rather choke under burden of expectations. He finds that teams from a higher division have a significantly higher probability of winning.

4.2. Ahead-behind asymmetry

Morgulev et al. (this issue) investigated NBA games to test whether an early lead in overtime has an effect on the probability of winning. Comparing leading teams at the beginning of the five minutes' overtime with the leading teams five minutes before the end of the regular time, the authors find no evidence that scoring first in the overtime has any effect on the probability of winning, implying that this lead does not create a positive momentum.

Bühren and Kadriu (this issue) conducted a basketball free-throw field experiment to test whether the ABBA order, which is used in a tiebreak game of tennis matches, is fair. The authors find a second-mover advantage in a short sequence, which disappears in a long sequence. In addition, participants with an internal locus of control performed significantly worse.

Avugos et al. (this issue) investigated penalty shoot-outs from the top international soccer tournaments to test the right-oriented behavioral bias according to which goalkeepers whose team is lagging behind dive more often to the right than to the left. The authors find a significant tendency to dive more to the right than to the left, but only

[5] See Bar-Eli (2018) and Bar-Eli, Avugos and Raab (2006) for additional references and discussion on the hot-hand phenomenon.

[6] From https://www.minneapolisfed.org/publications/the-region/interview-with-eugene-fama. Last accessed on 28/05/2020.

when a goalkeepers' team is lagging behind in the interim score.

4.3. Strategic behavior

Garcia et al. (this issue) utilized data on the movement of free agents in baseball to test how the choices of the free agents are influenced by social comparison concerns. They find that free agents are less likely to move between highly-ranked teams than between intermediately-ranked teams. The two follow-up lab experiments confirm this finding showing that social comparison plays a role in that market.

Given the lack of availability of reliable data on doped athletes, Wu, Bayer and Lenten (this issue) conducted a lab experiment to study the effectiveness of fines, bans and conditional pension funds in a fight against doping in sports. They find that a conditional pension system that allows athletes to receive payments after their career ends if they have never been found guilty of doping, leads to less doping compared to bans and to higher effort compared to the fine system.

4.4. Judgment updating

Finigan, Mills and Stone (this issue) used the event of pulling the starting pitcher, which is an important decision in baseball, to study the existence of Bayesian decision making among coaches. The authors find that pulling the starting pitcher reduces the runs without an effect on winning probability, suggesting that pulling starters decisions are approximately Bayesian optimal.

Singleton, Reade and Brown (this issue) investigated the forecast of soccer games made by 150 individuals to test whether revision of the forecast before the beginning of the game affected the probability of success. They report that revisions significantly decreased the forecasting performance, especially when the forecasts of the number of scored goals were increased.

5. Conclusion

Starting from the new millennium, an increasing number of articles have used sports data to investigate economic behavior, many of them being published in the top economic journals, including *all* traditional top five journals (*AER, Econometrica, JPE, REStud* and *QJE*). This trend can be explained by the quality and observability of sports data and by the high level of incentives and professionalism of the participants. This special issue has received the highest number of submissions among all the special issues in the history of the *Journal of Behavioral and Experimental Economics*. This illustrates the growing popularity of using sports data to study economic behavior and the trust in the results and conclusions obtained.

It is however important to note that sports data (as any other data) have their problems that might raise questions about their external validity. It is possible that professional athletes may have different preferences and characteristics, which may imply that they are not representative of the general population in their decision making, at least in some contexts. For example, sports tasks involve an excessive use of motor skills, frequent travels, remoteness from family, unusual exposure and pressure, all of which are uncommon for most people. Finally, most sports are homogenous with regard to gender, which is not the case in other contexts, such as the labor market. Thus, we have to be cautious before generalizing the findings from sports data and be honest about what such articles can and what they cannot promise, which is crucial for further trust in sports data. Sometimes controlled lab experiments may help to infer whether behaviors observed in sports data are more general or are peculiar to athletes. The potential in using sports data to study decision making more generally, together with the challenges, make this intersection of sports, psychology and economics a fertile area that promises many opportunities for interesting and insightful research.

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